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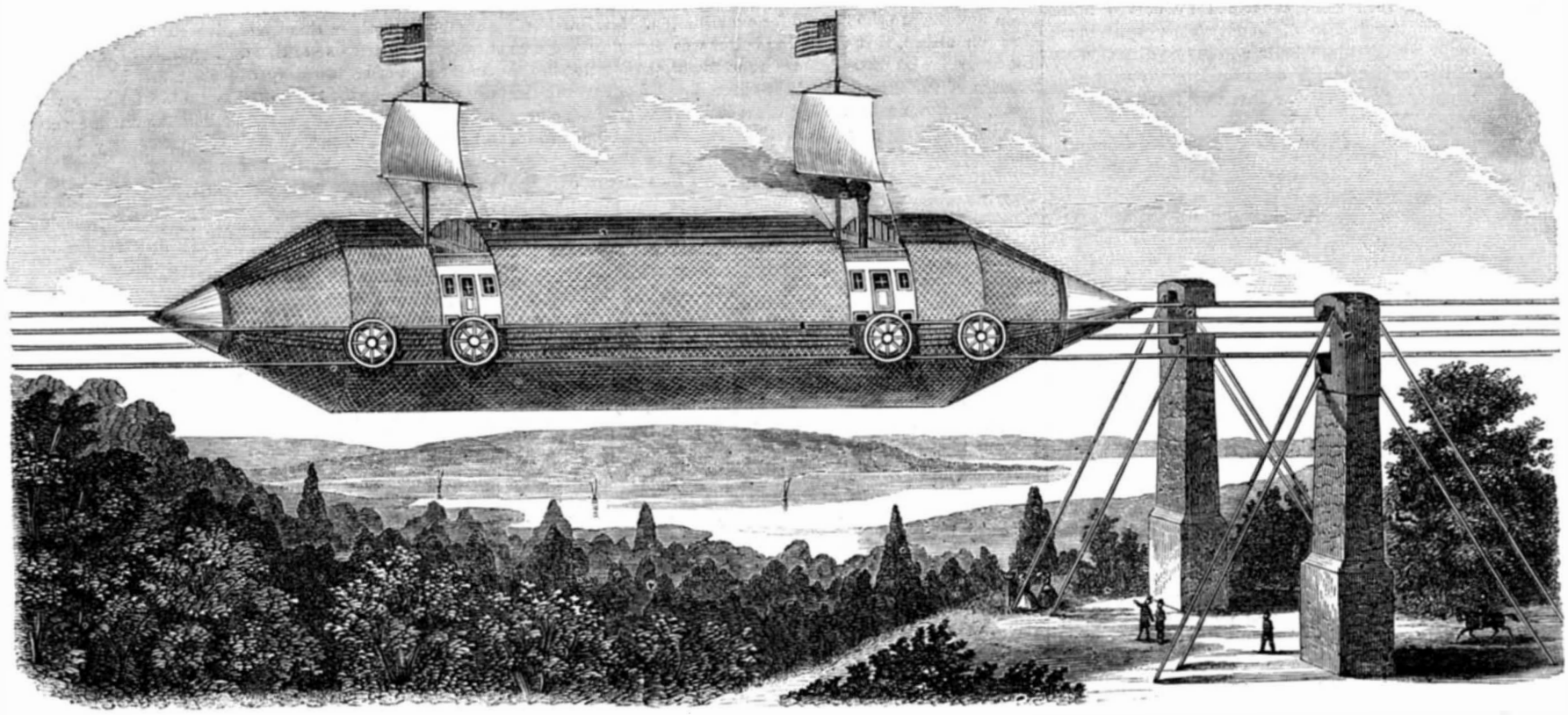
New System of Aero-Locomotion.

The two large engravings herewith presented represent two forms of locomotion designed to diminish the resistance of gravity to the motion of heavy weights, and in a measure that of the impact of the atmosphere against moving bodies.

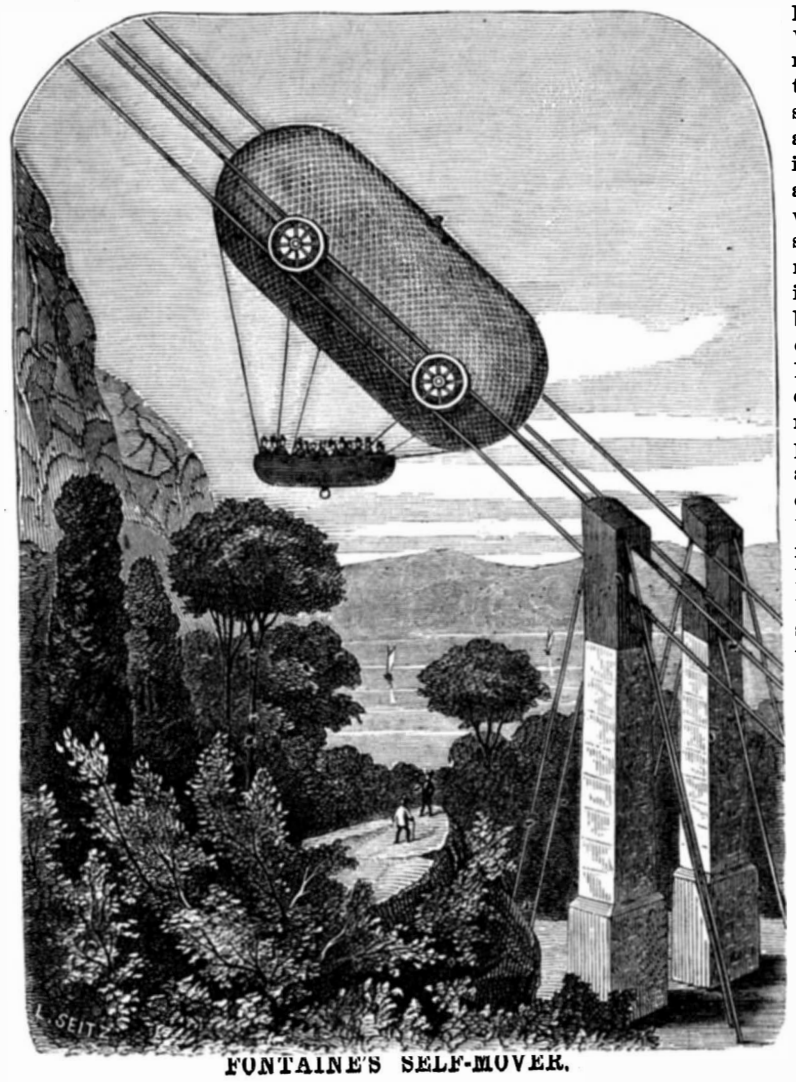


FONTAINE'S AERO-STEAMER AND SELF-MOVER.

It is a combination of a gas of great levity with steam, hand, or other power for sustaining and driving carriages for the transmission of passengers and freight, the carriages traversing elevated roadways composed either of wire or oth er ropes, or rigid rails, supported upon strong columns of masonry and iron combined, the rails, when of rope, to act as guys, being secured to some solid point in the earth in the manner of the ropes which support suspension bridges. These tracks or rails are double, one engaging with the lower surface of the wheels of the car and the other with the upper surface, the rims of the wheels being deeply grooved to insure their retention on the track whether the weight is positive or negative.

The objects of this improvement are two: One to combine the lifting power of a gas with propelling power, to diminish the weight of a carriage in traversing levels, or surfaces nearly level; and the other to provide, by means of the gas, a quick and feasible method of ascending elevations, in which case the rails or ropes are not used as tracks by which the vehicle can be impelled, but only as guides to control and direct its upward or downward movement. The first is called by the inventor an aero-steamer and the other an aero-self-mover. The aero-steamer has a portion of its spaces devoted to the reception of a gas specifically lighter than air, and is so formed, as may be seen by the engraving, Fig. 1, to present comparatively little resistance to the atmosphere. It is a cigar shaped balloon traversing the fixed guides of the stretched ropes, or the rigid rails, and moved, when on a level, by steam, wind-sails, or some other adequate means of propulsion. The frame of the structure is to be as light as comports with safety, while it is strongly braced with outside network, the lines of which pass under the compartments containing the motive power and thoseholding the passengers and freight. The columns which support the ways are so formed as to present no impediment to the free passage of the car, their forms being specially adapted to this object. If at any time the ascending or lifting power of the gas overbalances the positive weight of the carriage, the wheels engage with the upper line of rails, and when the weight of the carriage is greater they rest on the lower line.

The self-mover is designed for ascending elevations and the vessel is filled with gas, the passengers or freight being placed in the suspended car. The ascending force of the gas is intended to raise the carriage with its load, the whole being guided by the lines. In descending, the action of its gravity, assisted either by a partial exhaustion of the gas or a weight suspended to the bottom of the car, is intended to bring it to test its practibility. It was patented through the Scientific American Patent Agency, by J. A. A. Fontaine, M. D., whom address, Box 3, Station A, Spring street, New York City Feb. 5th, 1867, and who will be pleased to correspond with those interested in similar subjects, and will entertain propositions for the formation of a joint stock company or other arrangement which may lead to a thorough experiment of the plan.



FONTAINE'S SELF-MOVER.

Two Story Cars are in growing favor on the European railways. Some of those now in use on the French Eastern railway and branches are very elegant, and withal rather odd. They are a compromise between our democratic freedom and the European exclusiveness and constraint; the lower story being divided into compartments, and the upper, to which access is had by stairs at each end, being on the American plan, except the reversing seat backs. The latter appears to be too great a concession to individual comfort, as yet; so the seats are placed in pairs, staring one another in the face, coachwise. Some of these cars contain first, second and third class compartments, graded in style, furnishing and price; an arrangement inconceivable in America, where there are no 'umble people, and where pride must consequently minister to itself and expect no tolerance off its private premises. These cars are set very low on their axles like our street cars, and have also very low ceilings, the whole standing less than 14 feet high. The St. Petersburg and Moscow railroad has two-story cars 18 feet high, with a central saloon on the first floor, from which stairs conduct to a large apartment above, furnished with chairs, tables, sofas, etc. The American style of cars is having a trial on a short line between Lyons and Bourg-en-Bresse. An English correspondent in France illuminates the United Kingdom in regard to the American arrangement, explaining among the advantages, that "passengers may obtain refreshment at the bar which forms part of most passenger trains;" and among the disadvantages, that "some people visit the bar too often, and are constantly passing backward and forward to the annoyance of others, while the shortness of the seats never allows a stretch at full length." Our imaginative English friend might witness that incredible "stretch at full length" several times before he got tired of inquiring for the "bar," on an American train.

Sodium.---A Scientific Canard.

The exaggerated report of the explosion of a box of sodium, which originated in an American newspaper, and was long ago corrected in the Scientific American, is echoed back to us from a foreign scientific journal in the conclusion that the explosive force of that metal in contact with water is 30 times that of nitro-glycerin and 300 times that of gunpowder. Remarks follow upon the importance of the agent and the probability that the large demand will soon develop means for producing it cheaply enough for general use. Sodium, rapidly decomposing water, causes an explosive mixture of hydrogen and air, the moderate force of which is known to everybody, and this slight foundation is all there is for the statement.

It is a pity that newspaper reporters are not infallible, since their stories are so often circulated with unquestioning faith. We also observe in renewed circu'ation, a re-translation of another American story, which has gone through several languages and has now come back not much improved by its European tour, to the effect that caustic soda is even better

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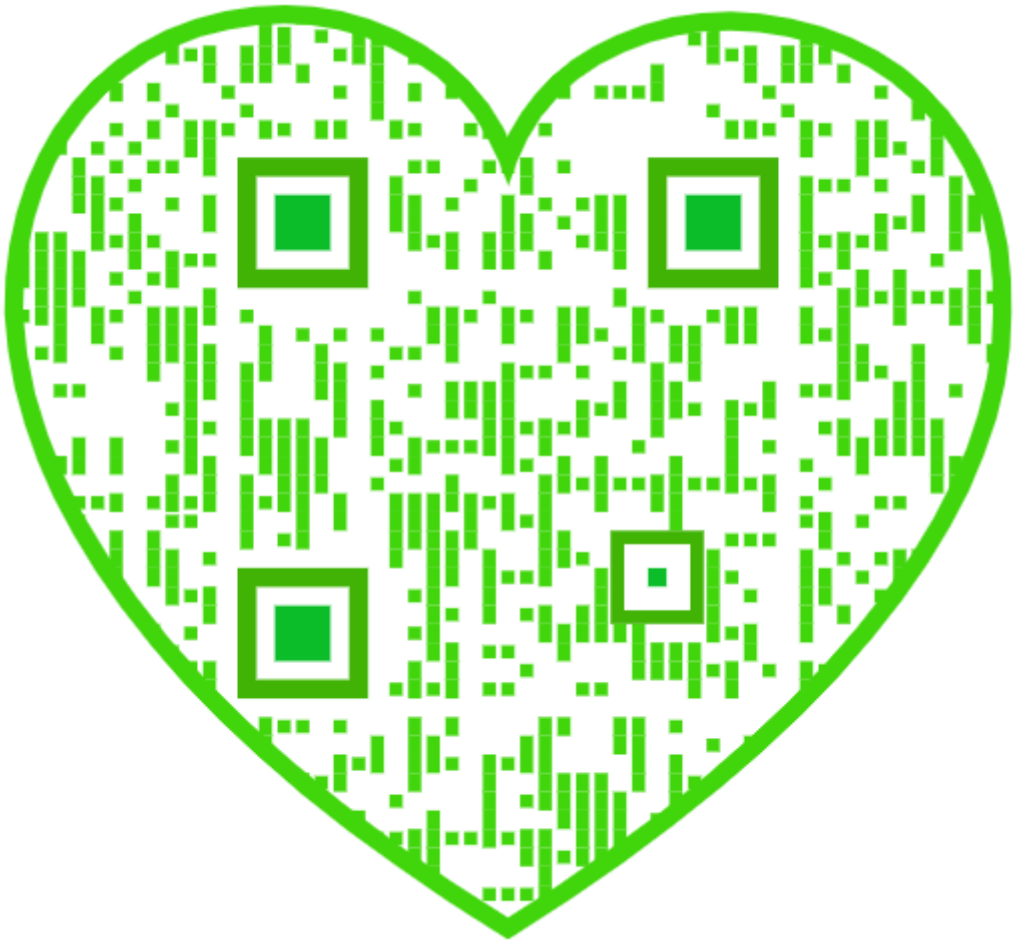

than sodium amalgam for separating gold: the latter in fact forming caustic soda in the process, before effecting its purpose. It is needless to say that there is no truth in this statement also.

HARRISON STEAM-BOILER.

Report of the Committee on Science and the Arts, Constituted by the Franklin Institute, on the Harrison Steam-Boiler, Invented by Joseph Harrison, Jr., Philadelphia, Pa.

The Committee to whom was referred the examination of the "Harrison Boiler," report that, on Tuesday, October 30th, 1866, they visited the foundry of Mr. Joseph Harrison, Jr., Philadelphia, and had an opportunity of inspecting the boilers in various stages of manufacture, and of seeing several in operation.

Experiments were tried to prove the strength and durability of the boiler, under extraordinarily severe use.

These boilers are of cast iron, formed of a combination of hollow spheres each eight inches diameter externally, and three-eighths of an inch thick, connected by curved necks three and one quarter inches diameter. These spheres are held together by wrought iron bolts, and in one direction are cast in sets of two, or four, with opposite lateral openings to each sphere, and are called by the inventor two or four-ball units, as the case may be.

He assumes that the boiler, in its smallest form, may be considered as one of these balls, with its opposite lateral openings closed by caps held in place by bolts. Two balls united by a neck, with caps over the four lateral openings, in the same manner would also make a boiler of a larger size. Four balls so united in one casting, would be a still larger boiler, and that any number of these balls or spheres may be united by bolts passing through them so as to form large boilers, and the strength of the boilers so made, will be the strength of the weakest sphere or ball in the structure.

In manufacturing the boiler for ordinary use, a number of these units are generally so arranged, as to form sections twelve and thirteen balls long, six balls wide. These sections are all tested by hydrostatic pressure, as high as three hundred pounds per square inch, before being delivered to purchasers. The Committee saw one of these sections subjected to a bursting pressure of water, one sphere bursting when the pressure had reached six hundred pounds per square inch. A socond one, tested in the same manner, burst at six hundred and twenty-five pounds. They were shown a section in which one unit had burst at nine hundred pounds per square inch, the damage having been repaired by the insertion of a new unit. The section then stood eleven hundred pounds per square inch before bursting in a new place. The available strength of the section in all cases being the strength of the weakest unit in it, the inventor holds that the boiler is safer than any other in use; in fact, he considers it entirely free from danger of disastrous explosion. To prove which, he had a section equal to six horse-power, similar to the one tested by hydrostatic pressure, and such as he is regularly selling, placed in an extemporary furnace built in a clay bank, and set in the usual manner for a boiler of this kind.

The boiler was filled with water to the regular hight, say about two-thirds full, with no outlet or safety valve of any kind, and sealed up tight, a small tube leading from the upper ball to a high pressure-gage, placed at a safe distance, say about two hundred feet from the boiler. A fire was made under and around the boiler, with the fuel of dry pine wood. The wind was very high at the time of the experiment, blowing from the west directly into the furnace, thus fanning the flames to an intense heat.

The gage soon gave indication of the formation of steam, the pressure steadily increasing up to four hundred and fifty pounds to the square inch.

At this pressure there seemed to be a sudden discharge of steam, as from a small opening. The discharge did not continue for many seconds, and the committee are not certain that it proceeded from the boiler; there may have been some water discharged from the bank of wet earth into the fire. The pressure then increased at a uniform rate until it had reached the enormous strain of eight hundred and seventy-five pounds per square inch, when a sudden discharge of steam took place, seemingly no greater in volume than might issue from a safety valve of two and a half inches diameter, or even less; after which the pressure fell to four hundred and fifty pounds, at which it stood when the fire was drawn for examination. While this boiler was being uncovered for examination, a boiler of about twelve horse power, consisting of two sections, similar to the ones previously experimented upon, was fired and steam raised to one hundred and twenty-five pounds pressure. This boiler had no safety-valve, but was provided with a globe valve of one inch capacity or area, as an escape valve to regulate the pressure in the boiler. When the committee examined this boiler at time of firing, it had two full gauges of water, the escape-valve was opened so as to reduce the pressure to one hundred pounds per square inch, and regulated from time to time to keep the pressure uniform at this point. The fire was pushed, and no more water injected into the boiler. In due time the lowest gage cock gave no indication of water. Soon afterward a slight leak was observed in one joint of the left-hand section. This closed in a few minutes and one opened in a similar manner in the right-hand section; this also closed in a short time. No other leaks showed themselves during the experiment As the water boiled away, the soot began to burn off the upper balls of the sections, that is, off those of the upper balls of the lowest row, visible through a peep-door above the fire-door provided for inspection. The boiler then became gradually red hot, and even when all the water seemed to be exhausted, and the pressure slowly fell, the gage stood for some minutes at thirty pounds, as if from the vaporization of some water in the lower courses of the sections, showing that in this red-hot condition, the boiler was tight enough to hold pressure. After the fire had been drawn, and the boiler cooled, the bolts holding the units together, were found to be loose, as if stretched by the unusual heating of the cast iron surrounding them. During the time of the experiment with low water, the escape cock was many times closed to increase the pressure, then opened quickly to reduce it to the one hundred pound standard, but with no deleterious result. When the gage stood at thirty pounds, all of the boiler visible from the peep-door and fire-doors, down to the bridge-wall of the furnace, was at a bright red heat. This was unmistakable, as when the fire was drawn, the boiler was hot enough to ignite a piece of wood held against it.

November 13, 1866.—At four o'clock, P. M., the committee met at the factory. J. Agnew, and J. C. Cresson, present. They examined the boilers tested at the former meeting. The boiler which had been subjected to its own steam-pressure of eight hundred and seventy-five pounds per square inch, had been removed to the factory for examination. Mr. Harrison's foreman stated, that when the boiler was first dragged from the fire, after its water had been forced out, (as detailed in the account of the experiment,) the three lower bolts were quite slack, but the next morning when it had become cold, one of them was again tight. The other two were not quite tight, but were then screwed up about one turn of the nuts. The committee are confirmed in their belief that in this extreme test, the pressure at eight hundred and seventy-five pounds, was enough to stretch some of the bolts, that the joints opened as safety valves, and thus releived the strain on the boiler.

The boiler which, in former experiments, had had all its water boiled out and had been heated to bright redness, was found to be quite sound and fit for use making steam freely, and showing no leak, blowing off at sixty-five pounds by the safety-valve. It was semewhat disfigured on its outside, by oxidation. Your committee was informed that it had not been changed or repaired since the trial, but that some of the bolts had been screwed up.

A third boiler of the same size as the above, twelve horse-power, was then tested in the following manner: after being filled with water to the upper water line, it was fired until pressure was raised to ninety pounds, at which it was blowing off freely. The water was then all blown out by the blow-off cock, the pressure falling to sixty pounds while blowing off, at which it stood until steam reached the blow-off pipe, when the pressure fell to zero. It was kept empty for three minwfth the fire still burning, and was then rapidly filled with cold water: and steam raised to one hundred pounds pressure in thirty minutes, blowing off at one hundred pounds, and was quite sound and tight.

The Committee was informed by one of its members, who was witness of, and cognizant of, all the facts, that at the establishment of Mr. Wm. Sellers & Co., of this city, a boiler of this kind has been in use for about two years. During some experiments in testing the Giffard Injectors made by that firm, a workman inadvertently loosened a connection to the water supply pipe, resulting in the pipe blowing full open, discharging the water from the boiler as fast as a two-inch diameter opening would allow, the men in the boiler room barely escaping with their lives. As soon as all the water had blown off, and access could be had to the boilers, the fires were drawn and cold water run in as fast as possible, and in about thirty minutes, the steam was high enough to run the engine, with no seeming injury to the boilers.

The Committee mention this as an accidental experiment, similar to the one above reported. The same boiler is still in use, and seemingly as good as when first erected. It is, however, the first one erected in this contry from units made in England, and is not so good as those made since then. On Saturday, November 17th, Mr. Harrison repeated an experiment in the presence of a part of the Committee, Messrs. Agnew, Morton and Sellers, which experiment he stated had been tried twice the day before, and once two days previous, all the experiments being with the same boiler. The experiment, as witnessed, was as follows:—

The boiler which had been under experiment November 13th was fired up, and steam raised to one hundred and ten pounds. The fire was active—what might be called a very clear fire—and in good condition to make steam freely. It had been kept up sufficiently long to thoroughly heat all the furnace walls. Steam was blowing off freely from the safety valve. At a given signal the blow-off cock was opened sud denly, blowing off all the water until the pressure had fallen to zero, and neither steam nor water was escaping from the blow-off cock. In fact, it is believed the boiler was entirely dry. The blow-off cock was then closed, and cold water from a well pumped rapidly into the hot boiler, for it was at all times exposed to the active fire. As the water entered the boiler, the pressure as per gage, rose slowly during an interval of about three minutes, when it is supposed the water level had reached the more heated portion of the boiler above the bridge wall of the furnace, for the pressure seemed instantly to increase to the hundred and ten pounds, and steam blew freely from the safety valve.

This pressure and escape of steam, continued for some minutes with no variation, when suddenly an escape of steam was evident from the boiler into the furnace, and upon opening the peep-hole door a jet of water was seen issuing from one of the joints. This leak, in less than a minute, suddenly stopped; then, as the water rose in the boiler, a similar sudden leak and sudden stoppage, occurred at the next higher joint; again, at a third one, when, by that time, the water was showing itself at the lower gage cock soon afterwards at the second when the pump was stopped, at which time the pressure stood at one hundred and ten pounds, steam blowing off freely from the safety valve. The fire was as active as when the experiment began, and the boiler perfectly tight. This experiment, as before remarked, had been repeated three times previous to the one witnessed by the Committee, and Mr. Harrison's account of the previous experiments, given to your Committee, agreed in every respect with the facts as seen by them. This is as severe a test as any boiler is ever accidentally caused to sustain, and is, in fact, the one most likely to occur from carelessness. It is also testing practically, the favorite theory to account for explosions. During the experiments, the employés of Mr. Harrison seemed quite fearless in their manipulation of the boilers, showing a confidence in their safety, truly remarkable. With the exception of the single boiler sealed up and submitted to the extreme pressure of eight hundred and seventy five pounds to the square inch, all the experiments were tried within the building in which the boilers are made, and any explosion would have resulted in serious loss of property, if not of life. Had any ordinary wrought-iron boiler, made in the simplest form, and of the best material, been submitted to these same tests, it would have probably been destroyed by any one of them. Regarding the liability to accumulation of sedimentary deposit in this kind of boiler, we can only say that it is asserted by those who have used them the longest, that by occasionally blowing out the water under a full head of steam, then allowing the empty boiler to be moderately heated by the hot furnace, filling up with water and rinsing out, the scale becomes detached and rushes out at the blow-off cock.

The Committee have carefully inspected the manner of making these boilers as practiced by Mr. Harrison, and find the greatest care is taken to insure perfection of workmanship; but at the same time it is eminently noteworthy that the peculiarities of the boiler, and its mode of manufacture, are such as to enable a high degree of mechanical excellence to be obtained by mechanical devices, apart from the workman's skill. Thus, in the process of casting, taking as an example a four-ball unit, the four eight-inch spheres united by necks 3¼ inches diameter, internally, have on each ball two opposite lateral openings, 3¼ inches diameter, thus making in all eight openings to four balls. The patterns are all of cast iron, parted lengthwise through the center of the unit by a plane at right angles to the lateral openings, these serving as supports to the green-sand core which is molded within the pattern itself, and not in a separate core box, thus insuring absolute uniformity to the thickness of the metal, and offering a more yielding core to the contracting metal than in the case of dry-sand molding. The lateral necks which are to serve as joints in combining the units into the boiler structure are faced off by machinery of the most ingenious kind, so arranged as to insure neat accuracy in the surface, the joints on one side having depressions to match projecting tongues on the other, these tongues serving with the longitudinal bolts to hold the units in position. One of the most thorough descriptions of this kind of boiler is the report of a paper read by Mr. Zera Colburn before the Institute of Mechanical Engineers in 1864, an abstract of which can be found in *Engineering Facts and Figures*, by A. Betts Brown, for 1864. He shows that although the tensile strength of cast iron is not so great as wrought iron, yet the spherical form of each unit of the boiler gives it an equivalent strength. He says: "The strength of a hollow sphere to resist internal pressure is exactly twice that of a hollow cylinder of the same diameter, material and thickness, and it can be shown that even a cast iron sphere, seven feet in diameter and seven sixteenths of an inch thick, is as strong as the shell of a Cornish boiler of the same dimensions." "The plane in which rupture, if it happen at all, will take place in a hollow sphere, is the largest plane that can be drawn through it, and the metal resisting the strain tending to cause rupture is the whole section of metal bounding the plane." "In a hollow cylinder the area upon which the greatest pressure tending to cause rupture will be exerted is that represented by the product of the length into the 'diameter of the cylinder.'" The ends of such a cylinder add nothing to the strength of the cylindrical part, in case of a rupture beginning at the cylindrical part.* The spherical form of each part of this boiler is one of its marked advantages, not only so far as strength is concerned, but as enabling a much larger amount of surface to be exposed to the fire than in any form of combined cylinder. To the spherical form with the curved necks has been ascribed by the inventor the property, which this boiler is asserted as having, to cast its scale when emptied of water, as there is no seeming abutment for the arch of the crystallized scale to spring from.

The value of cast iron, so far as durability is concerned, has long been conceded. The purer the iron the more readily does it corrode, while the mixture of even a small amount of carbon increases its ability to resist corrosion. Wrought iron water pipe under ground soon rusts out. Cast iron, even of the same thickness, remains good after many year's use; in fact, is considered practically to suffer no deterioration. Wrought iron in boilers decays internally—the most rapidly where moisture and air both operate, as in the upper side of mud drums, while they are often eaten through from the outside by trifling leaks, and the constant trickle of water over the surface. Wrought iron boilers are, according to the experiments of Fairbairn and others, so much weakened by the process of riveting etc., as to suffer a deterioration of about forty per cent. The Harrison boiler is made of pieces of as uniform strength as possible, united in a systematic manner. The uniting the units or pieces into mass, does not diminish their strength. In case of accident to any part of the boiler, the damaged part may be removed, and instead of being repaired,

*The metal effectively resisting the rupture in the cylinder being only the length of the cylinder. Thus, by comparison, Mr. Colburn arrives at his conclusion as to the relative strength of the two forms.—See *Engineering Facts and Figures*, 1864, pages 12 and 13.

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as is done with wrought iron boilers, new parts may be substituted, just as bricks may be taken out, and new ones replaced in a building. The patching of a damaged wrought iron boiler makes it weaker. The renewal of any part of the Harrison boiler gives it its original strength.

The experiments heretofore described, have been conducted to determine the safety and durability of the boiler under unusual and severe usage, or rather to determine whether any danger can result from submitting this kind of boiler to those circumstances which, in ordinary wrought iron boilers, are thought to result in explosions or great injury to the boiler.

The Committee are impressed with the great utility of the boiler, as one perfectly safe and free from all danger of explosion even when carelessly used. This recommendation alone, in a humanitarian point of view, must strongly commend it to public favor. During the experiments, its steam-making qualities were favorably noticed, and such boilers in actual use as your Committee have had an opportunity to examine, seem to give satisfaction in point of economy; but in the absence of all experiments in this direction, conducted under their immediate supervision, they do not feel qualified to report in figures as to its steam-making efficiency.

Comparing cast iron plates with wrought iron ones of the same thickness, the transmission of heat is known to be in favor of the former; hence the material, if in a safe form, is better adapted to economical steam-making than wrought iron. Ordinary boiler plate is seldom less than one fourth of an inch thick, and more commonly three eighths, particularly for high pressure. The castings used in the experiments for safety, were not over three eighths of an inch thick, and in one boiler set up in a form adapting it to marine purposes, some of the units were only three sixteenths of an inch thick, and were worked successfully at one hundred pounds pressure, driving all the machinery in Mr. Harrison's factory in an efficient manner. The principle of enlargement of the boiler by addition of units, and the fact that it can be constructed in any shape or style, just as various kinds of buildings are constructed of ordinary bricks, places it in the power of the engineer to adapt it in its form to the requirements of each particular case; so that with the known advantage of the use of cast iron, and the unlimited scope in the arrangement of heat absorbing surface, coupled with the demonstrated fact of safety, your Committee unhesitatingly approved and heartily recommend it to public favor.

Sub-committee appointed to make the examination: Coleman Sellers, Chairman; John Agnew, John F. Frazer, Henry Morton, J. C. Cresson.

Iron Works in Alabama.

From an old subscriber, F. Watson, of the Brierfield Iron Works, fifty miles from Selma, Ala., in Bibb county, we have a very gratifying account of the progress of the iron manufacture in his vicinity. He says:—

"These works are situated on the Alabama and Tennessee River Railroad. They were destroyed by Wilson in his raid, April, 1865, but have been partially rebuilt by a company of southern planters. They have now a hot-blast charcoal furnace in operation, making fifteen tuns of iron per day, a mill for rolling merchantable bar iron, a pattern shop, machine shop, and foundery, and will soon have in operation several additional puddling furnaces, billet rolls, nail-plate mill and at least ten nail machines. A second charcoal furnace will soon be started."

We are glad to hear of these evidences of enterprise at the South. Time, energy and perseverance, with capital, will eventually develope the riches of the Southern States so long dormant.

Editorial Summary.

THE DURABILITY OF SUBMARINE CABLES is a problem just now very prominent in importance, and in the thoughts of inventors. We noticed a few weeks since, the faulty construction and rapid destruction of cables hitherto laid, not excepting the Atlantic, but omitted to mention that the last Atlantic cable is protected with galvanized wire, and has therefore a fair "expectation of life." The latest proposal we have seen for increasing the protection against oxidation, is that of Mr. Latimer Clark, (Eng.) who patents a cable, served over the iron with two broad, strong and porous webs of hemp saturated with bitumen: the two webs being served spirally in opposite directions.—Another form of cable, somewhat novel in principle, has been patented lately by A. J. De Morat, Philadelphia. The core conductor is wound with two consecutive ribbons of thin copper, breaking joints, a coating of guttapercha is then applied, another pair of copper ribbons is served on, and so alternately the conductor and insulator are repeated until sufficient thickness is obtained. The advantage sought by this arrangement lies in the concentric position of all the conductors, giving them "a common electrical atmosphere," and in working the conductors separately, as positive and negative, obtaining a greater velocity in signals.

SOLUBLE BLUE.—Dr. Brucke obtains soluble Prussian blue by preparing a solution of 217 parts of yellow prussiate of potash and one of sesquichloride or tersulphate of iron made of 72 parts of protosulphate, or its equivalent of metallic iron, mixing each solution before they are brought together, with twice its volume of cold saturated solution of glaubersalts. The iron liquor is then added to the prussiate, keeping them well stirred, the precipitate is washed by decantation, until the washings come off blue. It is then transferred to a strainer, and afterwards dried and pressed between paper.

LIGHT AND HYDROGEN.—It is a suggestive statement, if correct, that an atmosphere of hydrogen supplies to plants the want of light, enabling them to grow green in the dark.

THE THAMES EMBANKMENT.—This great improvement in the British metropolis is interesting enough to warrant a short notice. The channel of the river is deepened by dredging, and narrowed and defined by a massive wall of granite on each side, surmounted by a handsome parapet, making in effect a great stone basin or dock, open at the ends, and flanked with piers of a peculiar construction to rise and fall with the tide. Each pier is a sort of granite dock, through which the tide freely passes, and its surface or floor is supported on a floating pontoon, rising and falling in its granite chamber. Bridges, with one end hinged on the wall and the other resting on the pontoon, connect the piers with the shore. The north embankment is so far forward that the completion of the main portion may be expected within the present year, leaving only the part between the Temple and Blackfriar's Bridge, which is not yet under contract. The south embankment is in progress, as yet, only between Westminster and Lambeth bridges. On the land reclaimed from the river, there will be room for a superior class of warehouses etc., besides a magnificent road and promenade extending the whole length on each side.

AMMONIA FROM THE ATMOSPHERE.—The nitrogen of the air is obtained and converted into ammonia (a compound with hydrogen, valuable for fertilizing and other purposes) by a process recently promulgated by MM. Marguerites and De Sourdeval. The air being passed through a calcined mixture of carbonate of baryta, iron filings, refuse of coal tar, and sawdust, the oxygen is converted into carbonic oxide, and the liberated nitrogen is introduced into a retort where barium is heated with charcoal, and there unites with the carbon, forming cyanogen, and with the metal, forming cyanide of barium. The cyanide is then decomposed by passing steam through it at a temperature less than 300°, and the nitrogen is disengaged in ammonia. Nitric acid may next be obtained, perhaps, by oxidizing the ammonia. But the application of the process to practical purposes on the large scale, is quite a subsequent question

IMPORTANT TO INVENTORS.—At the suggestion of Capt. W. M. Mew of the Treasury Department, who has been for some time past, engaged in the consideration of the most efficient means for preserving life at sea, and the advancement and security of the merchant service; public notice is given to all inventors having any apparatus or improvements that in any way conduce to the object above specified, to present the inventions for examination before a committee acting under the authority of the Secretary of the Treasury, at a meeting to be held in this city on the second Monday of April next. Such inventions are to embrace steam-engine boilers and safety valves, anti-incrustators, steam and water gages, steering apparatus and life boats with detaching tackle. Inventors may appear in person and explain their inventions, but no expenses will be allowed under any circumstances.

A NEW COMET.—M. Stephan, director of the observatory at Marseilles, discovered on the 22d of January a new comet, of considerable brilliancy, generally round, and with a well defined nucleus. The train is supposed to be in line with the nucleus and the earth, and therefore concealed. (Some comets, like Betty Bo-peep's sheep, "bring their tails behind 'em.") The nucleus appears denser on one side than the other, leading to the supposition that the train is fan-shaped. On Jan. 25th, at 8h. 53m. 35s. P. M., the right ascension was 2h. 33m. 53·5s.: north polar distance. 74° 26′: hourly movement in right ascension +5.17s. and in polar distance, —1·29′. The appearance of this comet is regarded as highly opportune for following up recent developments in spectrum analysis.

SAWING IRON.—The endless band-saw is now used with great success in England for cutting out locomotive frame plates and other work of like character. A saw half an inch wide, one thirty-second of an inch thick, lubricated with soap and running at the rate of 200 feet a minute, cuts out $\frac{7}{8}$-inch plates at the rate of one inch feed per minute, and works four or five hours at this rate without sharpening. The finest angles, inward and outward, are cut with precision never attained by old methods. An inscription of words, surmounted by the royal arms, the whole cut by the saw out of a heavy iron plate, is to be shown at the Paris Exposition.

PETROLEUM ENGINES.—Mr. Richardson's experiments under the patronage of the British Admiralty have resulted very encouragingly with an ill-adapted boiler, the construction of which impeded a full gaseous blast sufficient to consume the smoke as intended. During a trial of seven hours, 18.91 lbs. of water were evaporated per pound of fuel; the latter being the crudest refuse of coal tar etc. This is more than double the best practice with coal. Mr. Richardson has applied to the Admiralty for a large common marine boiler for further experiments in which it is expected that still better results must be obtained with an abatement of the smoke nuisance.

PRESERVATION OF EXHIBITION PACKING CASES.—The Paris Chamber of Commerce has made the following proposal for taking care of empty cases in which goods have been forwarded to the Exposition: "For closing, numbering, removing, and conveying the empty cases to the warehouses for storage, classing storing and insuring the same against fire during the Exhibition, and returning the same to the owners, two francs per case of one cubic meter and under, and for every additional metre or part of a metre, fifty centimes, about ten cents of our money.

THE CALIFORNIA BORAX COMPANY ships 2,500 lbs. of borax and upwards every day, at a cost for all expenses of $90 a tun. The article is said to be worth $320 a tun in the European market, and $600 in the American.

HYDRO-PROPULSION.—We observe a recent change of tone among English engineers in regard to the possibilities of this form of motor. The official result of the trial of the *Waterwitch* with the *Vixen* seems to show that with a very crude and wasteful arrangement of her water jets—wasting power both in lifting and short turns of the water ejected—she did quite as well as the steamer, making 9 knots with 750 indicated horse-power. At a subsequent trial with deeper draft she did better, and "the results, bad as they are," says *Engineering*, "have led to sanguine predictions as to the final success of the jet system."

THE CHASSEPOT GUN.—It appears that the French Government is actually going into the manufacture of its pet arm. (See illustration in SCIENTIFIC AMERICAN, page 16.) A large contract has been made in England, and an order is being filled for two hundred lathes for a company in Paris, to be employed in converting the present French rifles into "Chassepots." In view of the example of other Governments and the results of trials, this looks very much like sacrificing national safety to national vanity or private influence. It is true, however, that experiments and trials are still making with the Remington and other leading patterns.

TELEGRAPH LIGHTNING PROTECTORS have been introduced in France with much promise of success, composed of two smooth brass plates about two inches square, placed one above the other, and separated by a sheet of paper, or probably still bitter, by a thin film of mica. One of the plates is in connection with the line, the other with the earth; and as soon as a strong tension occurs on the line, the electricity passes in sparks from the former plate to the latter, perforating the insulator between, and escaping into the earth.

ERRATA.—The following corrections in Dr. Adolph Schmidt's article on making Bessemer steel, were received from the author after the article was printed. In the description of metal No. IV. strike out the words "and often partially fibrous." In the description of No. V., for the words, "its fracture is partly fibrous, partly grainy, with big dark colored grains"—substitute "its fracture is grainy, with bigger and darker colored grains, and shows frequently a disposition toward fibrous structure."

THE ATLANTIC TELEGRAPH.—The latest report to the company states that its profits from the time of the opening of the line, July 28. 1866, have been at the rate of 25 per cent per annum on its capital ($3,000,000) although the business is said to be only about one-twelfth of the capacity of the two cables, in consequence of the exorbitant rate charged. With a view to still greater profits, the rate was reduced to $1 25 per word on the 1st of March. One hundred words per minute can be sent through each cable.

TRIAL OF HORSE HAY-FORKS.—The examining committee of the Farmers' Club, in the trial of horse hay-forks alluded to in our last issue, have made their report, wherein they award the first prize, in class No. 1, to Palmer's Excelsior sickle-tined fork, and the second prize to J. H. Chapman of Utica, N. Y. In class No. 2, comprising harpoon forks, the first prize is given to C. C. Blodgett of Watertown, N. Y., the second prize to Messrs. S. E. & L. B. Sprout, Muncy, Pa.

COAL-CUTTING MACHINERY is wanted in the mines of England—as everything calculated to diminish the cost of iron making and to counteract the effect of strikes is now eagerly looked for by the alarmed English manufacturers—and prizes of £100, £200 and £500 respectively have been offered by the South Lancashire and Cheshire Association of Colliery Proprietors for the best three coal-cuttins machines submitted before November next.

RUSSIA AND THE CAUCASUS.—Russian correspondence states that a great joint-stock company has been formed for the improvement and development of the Caucasus: proposing, in short, to supply to a rude country at once, by adequate organized capital, the public works and industrial machinery which would otherwise be accumulated only by the slow progress of ages, if at all.

SNOW IN LOUISIANA.—A correspondent adds to the catalogue of snow storms in eighty years, one which he witnessed in Madisonville, La., on the 18th of February, 1864, on which day also, as a letter informed him, it was snowing furiously in New Orleans. Since that time [until the present year, as our paragraph meant but failed to say,] no snow has fallen in Louisiana—so far as we are informed.

GLASS-ENGRAVING INK.—M. Kessler's successful experiments in engraving flint glass by means of alkaline fluorides and acids have led to the preparation of an ink from hydrofluate of ammonia and hydrochloric acid, with which characters and designs may be written ineffaceably upon glass.

A GREAT RAILROAD FERRY PROPOSED.—The North Eastern Railway Company of Switzerland, with those of Wurtemberg and Baden, are discussing a plan and estimates for carrying the trains across the lake of Constance on steam rafts of 200 horse power.

HORSES are beginning to receive the benefit of anæsthesia in surgical operations. It has been applied with success locally, both by means of ether, and of the rhigolene spray. Many horses may thus be saved by operations which otherwise would be impossible or fruitless.

VENTILATION METER.—General Morin has submitted to the French Government an electric anemometer, by which the state of ventilation in hospitals and public buildings is accurately indicated.

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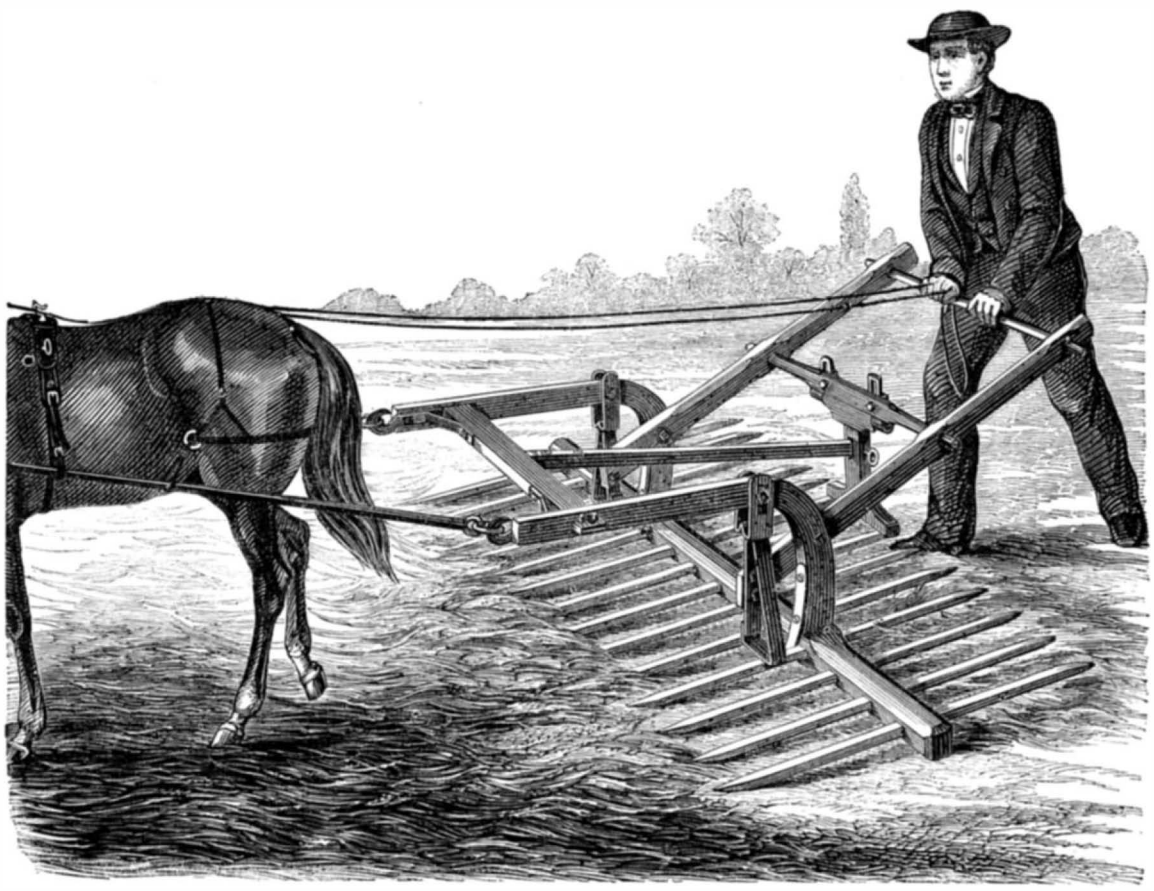
Improved Horse Rake.

This rake appears to be one of the best we have yet seen, judging from the model before us. That at least works excellently well. It is a revolving rake; as soon as the acting line of teeth are loaded, a slight motion of the driver's hand reverses the rake and lays the hay in windrows ready to be ricked. The rake proper rotates in straps on the lower ends of curved bars which serve also as a means of attaching the horse. From these bars project, at the rear, two guiding bars properly united by connecting rods, the upper one serving as a handle for the driver. These rear bars are pivoted to the curved supports, and at their forward ends are bolted to reversed V-shaped springs, one leaf of which is free to work in the angle of the spring. Holders to keep these springs in place while working are attached to the curved bars directly over the springs, which act to keep the forward part of the rake to the ground. The inside cross-bar below the driver's hands has a stop or pendulum connected by a pivoted rod with the cross bar on the draft or curved shafts. This pendulum acts with the springs on the forward side of the rake to keep it in position.

When the rake is full and it is desired to empty the load, the driver slightly pulls on his handle, which draws back the curved shafts and disengages the pendulum, allowing the rake to rotate. The back of the rake, in coming to place in front, acts on the inclined side of the V springs, pressing it in until the teeth have passed it, when the bottom shuts over the teeth, holding all snug. The holders over the springs and the supports of the pendulum at the rear are adjustible to regulate the draft. The rake is made quite light, is easily managed, and appears to be a very desirable implement. It was patented by Atlas H. Chaplin, Tecumseh, Mich., who will furnish any other particulars desired.



CHAPLIN'S HORSE RAKE.

[For the Scientific American.]

GOLD HUNTING AND GEOLOGY.

Within the last fifteen years a series of excitements, in relation to discoveries of gold, have occurred in Ohio, Indiana, and Iowa. In nearly every instance some gold was found, but the localities never afforded it in paying quantities, and disappointment followed. None were ever paid for their labor.

The question naturally arises, if some gold has been found in the states named, why may it not exist there in quantities as well as in the Carolinas, Georga, and the Pacific States and Territories? It may be well to answer this question in the light of Geology.

All gold and silver is derived from fissures in the rocks, which have been filled with these metals from the interior of the earth. These veins never exist, except in regions where there has been much disturbance of the earth's crust, by what geologists call plutonic action, to distinguish it from volcanic action. The stratified rocks of the globe, when undisturbed, lie in horizontal layers or beds, and, where no internal heat has reached them to change their condition by metamorphism, are usually more or less filled with fossil remains of vegetables and animals. In such rocks mineral veins are not to be found, such as gold, silver, and copper. But where the strata have been thrown up into a vertical or inclined position, there metallic veins may be expected. Silver and copper are usually found in these veins, in the form of ores which are soluble in water; but gold being insoluble in the acids existing in nature, is always found in its pure state as a metal, though often in such minute particles that it cannot be detected by the eye. As time wears away the rocky strata, including the gold veins, this metal, remaining undecomposed, is strewed over the surface in the vicinity of its veins, or is carried away by rains glaciers, or currents of water, along with the sands, gravel and rocky fragments with which it becomes intermingled. Being of greater specific gravity than the debris of the rocks, the gold in its transportation finds its way to the bottom of the loose deposits, and is mostly found resting there upon the undecomposed rocks.

Gold is found then in two conditions: included in veins, and strewed over the surface at the base of drifted deposits. But silver and copper, occuring generally in the form of ores soluble in water, mostly disappear from the surface as the veins are worn down, and are not found in paying quantities, except at depths at which they remain unaffected by atmospheric agencies.

Now, whenever surface-gold is found in a region where the rocks are disturbed, the geologist infers that gold veins exist near at hand; but if the rocks are undisturbed, the finding of surface-gold is no indication that veins exist in its vicinity. It must have been transported from a distance, along with the drifted deposits at the base of which it is found.

Throughout Ohio, Indiana, Illinois and Iowa, the rocks are all of the stratified order, and remain nearly horizontal, having never been broken up by plutonic action and the intrusion of metallic veins. The only exceptions are in the lead regions of Illinois and Iowa, where disturbances have occurred. According to geological science, gold veins are not to be found in any of these states where the rocks remain horizontal, but gold has been found in them all. How is this fact to be explained.? In the states named, there is strewed over the surface of the country, in irregular beds of various depths, what is called the diluvial formation. It is composed of boulders of granite and metamorphic rocks, gravels, sands, clays and portions of the local rocks. No granite, syenite, gleeiss, or other primary rocks exist, in place, in any of these states. The masses of them, strewed over the surface, and forming part of the diluvium, have therefore been transported to their present resting places from a distance. What little gold has been found is included in this diluvium, and has been transported along with the boulders. All the varieties of rocks represented in the diluvium, are to be found to the north-west, in the Lake Superior and Rocky Mountain regions. Their transportation eastward is supposed to have been effected by the agency of icebergs, at a period when the continent was immersed in the waters of the ocean, or by the inflowing of the sea over the continent from the north-west. The particles of gold in the diluvium, must have been derived from that source. It is no more strange to see gold in this formation, in Ohio, than to see blocks of granite in it there. As granite must exist in place, so also must gold veins exist there; but to what extent, and in what quantities, none can yet determine.

The foregoing deduction was made in 1858, when no discoveries of gold had been made as far north as Nevada, Idaho, etc., and supplies an additional proof of the value of geological facts and sound deductions therefrom.

From all the examinations made in the states under consideration, no encouragement is afforded to the gold hunter to dig any longer in their diluvial deposits. It must be labor lost. This will be apparent when it is considered, that the veins from which the gold already found has been derived, must be located at a distance north-west, beyond the range of the undisturbed and fossil-bearing rocks; and that he who would find it in paying quantities, must shift his labors to that distant field of action.

It has been said that the rocks of Ohio and Indiana are nearly horizontal; and that they have not been subjected to volcanic action and the intrusion of metallic veins. This is true also of the greater part of some of the other western states. A line drawn from Sandusky City, to Knoxville Tenn. presents the strata of the rocks nearly horizontal as far as Cumberland Mountain. South of this point the disturbances commence, and extend for nearly three hundred miles, or to where the newer formation begins. Within this space all the veins of copper and gold-bearing quartz are found. Nearly everywhere along this line, after entering the mineral range, the strata are highly inclined and metamorphic—in some places being nearly vertical. The same condition of the rocks exists in California, where both surface gold and vein gold are found.

Could the gold hunters of Ohio and similar states see the vast difference between the geology of a true mineral region and that of the one they have been vainly exploring, the contrast would be so striking as to make them desist at once from their fruitless toils; and did editors possess a little more knowledge of geology, it would prevent them from misleading their readers to an injurious extent, by reporting the discovery of valuable mines where that science says none can exist.

D. C.

Cholera Animalcules.—Dr. Kolb, of Vienna, has found by microscopic examination that the rice-water discharges contain countless mushroom-like insects, or "entomistic excrescences." To destroy these organisms and arrest their propagation, is the problem now before the profession.

WHY A BELT RUNS ON THE LARGEST DIAMETER OF A PULLEY.

In our issue of Feb. 16th, we stated, in reply to a question of a correspondent, that if the two shafts connected by a belt were kept in line with each other, *i. e.*, parallel, and the belt itself kept straight, there would be no necessity of having the faces of the pulleys crowning; but that if the shafts were slightly out of line, the tendency of the belt, as of liquids on a revolving shaft, was, by centrifugal motion, to traverse the part furthest from the center, and therefore the belt would seek the crowning portion of the pulley.

J. S., of Connecticut, thinks this reason will not apply to all cases, no matter what the speed of the shafts, *i. e.*, that of the pulley faces. He further says: "Unless any belt having width runs on a straight pulley at right angles to the axis of rotation it will work toward that edge of the pulley nearest the end of the shaft with which it forms the acute angle. Now if a belt having width is laid on a taper pulley at right angles to the axis, that edge of the belt embracing the largest circumference will move faster than the other edge and the belt will be bent edgewise, and a short portion will approach the pulley at an acute angle on the side toward the largest diameter, and consequently the belt must work gradually to the largest part of the pulley."

We cannot see in what respect the statement of our correspondent affects the reply we made. He acknowledges that if the shafts are not in line the belt will tend to that portion of the pulley furthest from the axis, and that the belt will necessarily become crooked. Our position was precisely the same; but J. S. seems to ignore the force of centrifugal motion unless the motion is rapid, which is, we think, an untenable position.

J. W. S. also attacks the centrifugal theory by the same statement in regard to a curved belt, made so by the stretching of one edge. He illustrates his idea by a diagram of a wide-face, crowning pulley, with a belt running with one edge on the largest diameter and the other on a smaller diameter at the end of the pulley, and says that though the shafts may be in line the curve of the belt will in reality direct the belt on the pulley at an acute angle, or out of line, and as every turn of the pulley tends to roll the belt to the center, it will so move until the strain is equal on both edges.

If this is so, and only the stretching of the belt's edge compels it to traverse the highest point, it would seem that one edge being once curved, the time could not arrive when the strain would become equal on both edges, unless the belt passed its width entirely over the highest part or crown of the pulley, when the belt would have attained its normal condition of straightness and again repeat the process of traversing transversely indefinitely.

[For the Scientific American.]

OUR NAVY—ONE STEP IN THE RIGHT DIRECTION.

The Hon. Mr. Grimes has introduced a bill in the Senate of the United States, the principles of which if carried out, will do more toward improving our navy than any Act of Congress passed since the Rebellion broke out. The bill proposes to create a Board of Commissioned Officers consisting of three Line Officers, a Chief Engineer, and a Naval Constructor, "who shall examine all plans and specifications for the construction, equipment, armament, and repair of all vessels," before any money shall be expended or contract made for the construction of any vessel of war." This certainly looks as though the object of constructing ships was to be well considered and the plans carefully matured before the work was commenced, either in the navy yards or contracted for by outside parties. It is time that we adopted the principle of knowing beforehand whether we are going to build fighting ships or pleasure yachts; or whether the vessels we propose to build will, when prepared for sea, float, and if so, whether the guns can be worked in a seaway.

One would believe after reading the well-written Report of the Hon. Secretary of the Navy, if not conversant with a detailed history, that we had a very respectable and formidable navy, both in numbers and strength, and quite sufficient for the protection of our commercial interests and our rights in any foreign country. Undoubtedly our aim should be to have a navy that can fight not only gun for gun but tun for tun of any naval power whatever; for by such a standard, our relative strength must be compared. If we do not keep on hand, built and ready for equipment, so large a number of vessels of war as some other nations do, we must be prepared with the requisite facilities, such as materials and tools, navy yards, dry docks, workshops, and storehouses, with which a large number of ships could be built on the shortest possible notice, and that will constitute our naval strength.

Can any one of common capacity review what has been done

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in the navy during the last six years, and consider the actual condition in detail, without feeling chagrined and mortified at the result? The Secretary's report and the Navy Register say that we have sixty-one iron-clads; do the people know that sixteen of them were built from models of 614 tuns burden, and that not one of them will, if the proposed armament, stores men and effects are put on board, float, and that they are entirely useless? Would this have been the case if the plans and specifications had been submitted to a competent board for their examination? Some one in authority made contracts for these vessels to be built, and furnished plans without knowing whether the ships would sink or swim, and should be held responsible for this waste of money.

Some seven or eight more out of the sixty-one iron-clads were captured from the enemy and are not worth keeping in repair. Three of the iron-clads, the *Dictator*, *Puritan*, and *Roanoke*, draw too much water to be used for harbor defence and are not safe for cruising at sea. The *Puritan* was intended to carry two turrets, but being of the same model as the *Dictator*, which was found to have too little capacity for even one turret with all of her deck plating, coal, stores, and men and their effects on board, it is supposed if she is ever finished she will have only one turret. Eight of the iron-clads were built after the model of the *Manhattan* of 844 tuns burthen carrying two guns each, and did some service during the war in frightening the rebels, but could not take Fort Sumter, or blockade Charleston, and are not to be considered of much account in future warfare. We have nine iron-clads of the *Canonicus* model, 1,034 tuns, carrying two guns each, and they are a small improvement upon the *Manhattan* class. Two are to be returned to the contractors. Deducting the above number from the list of iron-clads, we have fifteen left, four of the *Monadnock* and *Miantonomah* class, four of the *Kalamazoo* class, now building, and seven of no value in a naval point of view. The *Kalamazoo* class were intended to be an improvement on the *Miantonomah* class, and as structures showing mechanical skill, they are equal if not superior to any vessel built, but as engines of war it is doubtful if they are equal to others, inasmuch as they will draw more water, have no more speed, be longer time in turning round, owing to their great length, carry more men, burn more coal, consequently be more expensive to keep in commission and only carry the same number of guns. Y. Z.

Science Familiarly Illustrated.

What is Clay?

[We cannot do anything better for our young readers on this subject, than to borrow the following from the *Country Gentleman*.]

On the table before us, lies a bright piece of sheet metal. It is not as bright as silver, and it has not the intense blue tinge that distinguishes zinc. Its surface soon gets soiled and dull, otherwise it would probably assume a place as one of the precious metals. But nitric acid, in which silver dissolves almost as easily as sugar does in water, has no action upon this metal, and beyond the first mere dulling of the surface it remains for years without rusting or tarnishing. But by far the most singular feature of the metal before us is its lightness, or as a chemist would say, its low specific gravity; for while osmium, the heaviest body in existence, is nearly 21½ times as heavy as water, silver ten times, lead eleven times. steel eight times, and zinc nine times, aluminum is only two and one half times as heavy as water.

Hence a teapot made of aluminum would weigh but one-forth the amount that one of the same size made of silver would do, and this property of the metal has caused it to be used in France in the construction of helmets and of the eagles which surmount the standards of the imperial forces, it being of great consequence is these cases that the weight to be carried should be diminished as much as possible.

As yet, however, this beautiful metal, of which the soil beneath our feet may be regarded as one vast mine, has not been brought into anything like general use, and we presume that many of the readers of this article have never seen it. It has, it is true, been made into spoons, which have been sold as curiosities, but the only really useful purpose to which it has been applied in ordinary life is the manufacture of pens. For this purpose we understand aluminum, is but little inferior to gold.

One gentleman in England took a brick from an old Roman wall and extracted from it a sufficient amount of aluminum to manufacture a pen, with which he wrote a very interesting book.

But although in these days a metallic base is an attractive subject, we must pass on. When this bright metal is burned it forms a beautiful white powder—alumina. It seems strange to talk of a metal burning, When men wish to make a fire-proof building, they employ iron for shutters, stair rails, etc. And yet in some conditions iron is more easily ignited than gunpowder. We have seen a popular scientific lecturer pour iron in fine powder out into the air, and it took fire itself, which gunpowder will not do. He then held up a large bunch of iron filings, set them on fire with a match, and they burned like tinder, falling down in splended burning flakes. All this was in the open air and without the aid of chemicals. Then again, we saw him take a brilliant silvery metal—magnesium; it was in the form of a slender ribbon, which he ignited with a spirit lamp, when it continued to burn, giving out a light of dazzling brilliancy—the famous magnesium light which can be seen at a distance of sixty miles.

Alumina, as we have said, is a beautiful white powder. It is but very rarely found in nature uncombined with other substances. We do not say unmixed, but we use the stronger term, uncombined. The sapphire, the amethyst, the topaz, the ruby, and the emerald, are nearly pure alumira, and it is curious that the soft clammy earth alumina, should produce gems which, in hardness exceed quartz, and rank next to the diamond.

It also occurs combined with water in a few minerals as Diaspore, Gibbsite, etc., but it does not occur uncombined in any quantity in nature, and we might just as well say that water is the breath of life because it contains oxygen, as to say that clay is alumina.

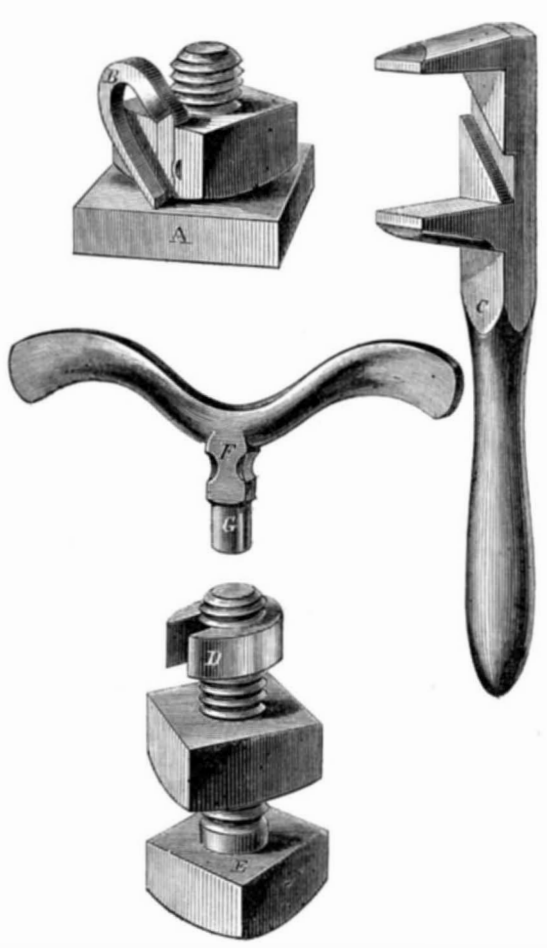
Alumina, in its general character, has a strong resemblance to the earths, but on the other hand it seems on some accounts to have a greater affinity to the groop of which iron and manganese are members.

Like these metals, it combines with acids to form salts, bnt never fully neutralizes the acids so that sulphate of alumina, like sulphate of iron, has always a slightly acid reaction. And like iron and manganese, aluminum, can form the base of an acid as well as the base of an earth, and thus form salts, of which it can play the part of an acid or a base. Thus with sulphuric acid, it forms a beautiful crystalline salt—sulphate of alumina. With potassa, it forms the equally definite compound alumlnate of potassa, while in the well known substence, alum, it assists in forming a double salt—sulphate of alumina and potassa. This peculiar property of alumina, or perhaps of aluminum, probably confers upon its charactures whose value has not yet been fully appreciated. It probably gives it a mobility which enables it to perform importent, though hitherto but little understood functions in the nutrition of plants, even though alumina itself is not plant food.

Pure alumina is rare, except in combination with silica or quertz, it forms the great bulk of many soils. In this combination the silica plays the part of an acid, and the resulting compound is not in any sense a mixture. Even the beautiful white clay which is sometimes called pure clay, contains a large portion of silica, and this silica connot be separated by any mechanical means. It forms a true chemical compound—silica of alumina.

HARRIS AND BROWNING'S SPRING-FRICTION NUTS.

Railroad men are greatly annoyed by the working loose of nuts on the rolling stock, consequent upon the jar and continual vibration of the parts. The evidences of this are to be seen on the line of all railroads in the large number of nuts scattered along the track. The ordinary check nuts are not sufficient to overcome this annoyance, as, whatever the force applied to set them up, they will start after being for awhile exposed to the never-ceasing shaking and trembling of the train



A, in the engraving presents one form in which the nut carries its own check. This is a curved spring, B, seated in a dovetail slot on the side of the nut and set up by a cold chisel.

This slot can be formed when the nut is punched, if machine-made. The point of B stands a trifle below the face of the nut, and in screwing the nut against the face of the plate A, the spring gives and slides over the plate. But when the nut is turned the other way for unscrewing, the point of the spring seats itself into the plate or against the surface, and refuses to yield. It is evident that a common wrench will not suffice to start this nut, and the inventors have contrived a wrench, seen at C, for the purpose of unscrewing it. On the inner face of the wrench is a diagonal slot cut at an angle corresponding with the overhang of the opening, B. When placed on the nut this inclined slot engages with the spring, and, as the wrench is turned in the act of unscrewing, its side lifts the spring just before the jaws of the wrench gripe the side of the nut. Once started from the plate, A, the spring does not intefere with the turning of the nut.

D is a spring check-nut to take the place of the ordinary check-nut. The thread tapped through it is made by a tap slightly smaller than the shank of the bolt, E, and the jaws of the nut are sprung apart slightly to enable it to register with the thread of the bolt. Of course this check-nut cannot be started in either direction by a common wrench, and therefore a pocket wrench, or key, F, is used to open the jaws. The stem, G, of this key is of oval form in its cross section so that by turning it after it is inserted between the jaws of D, tho jaws are spread and the nut will turn easily on the shank of the bolt, E. From the specimens before us we have no doubt of the efficiency of this device for the purpose intended. The improvements are the subject of two patents dated Jan. 27, 1867. For additional particulars address Wm. Harris or Clinton Browning, Rush Run, Jefferson Co., Ohio.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Exploding Force of Cylindrical Boilers.

MESSRS. EDITORS:—The received error to rupture a cylindrical boiler by internal pressure, has been previously noticed by me in the SCIENTIFIC AMERICAN, but the present article presents a clearer view of the opposing theories.

This error consists in estimating the force exerted to rend the circle apart at any two opposite points, to be as the pressure on a space equal to the diameter, instead of the semi-circumference, or their equivalent the quarter circle, compared with a space equal to the radius.

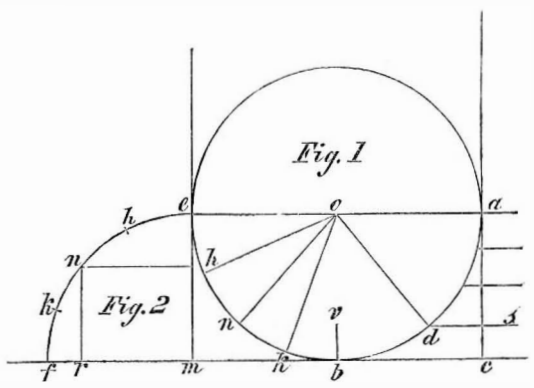


Fig. 1 is the ring of a boiler, and the parting point considered at top and bottom. Divide the space *a c* (equal to radius=1) into four equal parts. Let the pressure of steam in the boiler be 0·25 on a space equal to each one of the divisions, making the total of force on *a c* equal to 1, to separate the ring horizontally at *b*, by the received theory.

Select the lower division with its proportion of force =0·25, alleged to be derived from the steam pressure on the arc, *d b*=0·72. Now by the irrefutable law of statics, the force to rend asunder at *b* is inversely as the versed sine, *v b*, to the arc, *d b*, being an increase of 0·47 over the direct and horizontal force of 0·25+0·47=0·72. This law of the parting force being as the versed sine to the subtending arc, is uniform and true at any point from *b* to *o*, and is applicable to all cylinders subjected to internal gaseous pressure, from the most fragile tube to a piece of ordnance.

In Fig. 2 the arc, *e f*, represents the supposed motions and varied direction of the rays of pressure on the boiler arc, *e b*, and are in the directions of the corresponding parts of the arc, *e f*, as *h h*, *n n*, *k k*, etc,, the sum of which, =1·57, is to be met by the required resistance of force =*m f*=1, and being of increased intensity, as it is less than *e f*. Therefore the parting effect of the pressures on arc, *e f*, is as much greater than that on a space equal to the radius as by the diagram *e f* is greater than *m f*.

Comparative forces to rupture:—Received theory, *a s*=0·75; *s c*=0·25, 1. Correct theory, *a d*=0·85; *d b*=0·72, 1·57.

Statement of values: *d* and *n*, angle, =48·8°; *n d*, chord, =1·32; *v b*, versed sine, =0·25; *e n*, arc, =0·85; *n f*, arc, =0·72; *m r*, distance, =0·75; *r f*, distance, =0·25; *r n*, ordinate, =0·66.

THOS. W. BAKEWELL.

Cincinnati, Ohio.

Beet-root Sugar Machinery.

MESSRS. EDITORS.—We observe in your issue of the 16th inst. a continuation of Prof. Hirsh's interesting article on beet-sugar; in which, when describing the boiler apparatus, he says, "The vacuum pan, one of the neatest pieces of machinery employed in the manufacture, is used in Europe with a view to more economy than is used in this country. Here single pans are used, the vapors of which are condensed by water. In Europe the heat of these vapors is used to evaporate juice in one or two adjoining pans when the liquid is boiled under a still more reduced pressure" etc.

These remarks being founded on a misapprehension, we beg leave to inform your readers, that the plan referred to is known as the "Rillieux process," invented and patented in this country; that it has been extensively used in the manufacture of cane sugar in this country since 1843, in Cuba since 1850, and in South America for three years past; and that the "European machinery" referred to in the article above quoted, is made there from drawings originally obtained in the United States; it being found superior in economy to the French system of Dérosne, which it has supplanted to a great extent in Cuba, on that account as well as because the sugar made is better in color, not being exposed to the air as sirup on the "harp" refrigerators, as it is in the latter system.

We have been engaged (exclusively in this country) since 1843, in the manufacture of the Rillieux system of sugar boiling apparatus; and as it has worked a revolution in the process of sugar making from the cane, we are unwilling to see the credit pertaining to the American inventor (Norbert Rillieux) summarily transferred to European copyists. The beet-

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root sugar process requires exactly similar machinery to the cane sugar process, excepting only the apparatus to extract the juices from the beet or cane respectively.

Merrick & Sons.

Philadelphia, March 13, 1867.

Safety of Kerosene Lamps.

Messrs. Editors:—There seems to be much misapprehension as to the principal source of danger in the use of kerosene lamps. If the prevailing impressions on the subject were correct, scarcely one of these lamps would fail to explode. It appears to have been observed that kerosene, benzine, and the vapors therefrom, even when mixed with air in explosive proportions, cannot be inflamed by contact with metal even at a red heat. To ignite them requires contact with flame. Even a red hot cinder, if not in a state of active combustion, will not ignite the most inflammable of the substances named. The danger of lamp explosions, therefore, is not more and in some sense not so much, from heated brass or from a highly inflammable quality of the oil used, as from such conditions in the burner as will, under any circumstances, admit flame into the reservoir of the lamp.

Under all ordinary circumstances the only avenue by which flame can be so admitted, is the "vent," an orifice at the bottom of the burner for the escape of the vapor, etc. Some have contended that no other vent than the wick tube is necessary, but properly conducted experiment will soon show that a distinct orifice for vent is advantageous. A small well-arranged tube is undoubtedly one of the safest possible vents. There is no danger, however, from a simple orifice, provided it is quite small and the burner is so constructed as to guard the orifice properly from the access of flame. There are a few and unfortunately there are only a few such burners in the market.

E. S. Blake.

Pittsburgh, Pa., March 4, 1867.

The Uses of Heavy Petroleum.

Messrs Editors:—It seems to be generally understood that heavy petroleum is serviceable in its crude state, only as a lubricator, but there are other uses to which it may be put, and at a great saving over the cost of other oils, commonly used. The Albany *Cultivator* says, "crude petroleum is the best oil to apply alone to wood as a preservative, being greatly superior to linseed oil. It has been little tried by way of mixing with ochres, or earth paints, but the little we have seen nduces us to think favorably of it for this purpose." The writer has tried it for oiling wood and concurs in the above statement: varnish dries on it perfectly, and if anything with a better gloss than on linseed. Furniture and agricultural implement manufacturers, who finish much of their work in oil and varnish, will find the lubricating petroleum better than linseed oil, and of course much cheaper, as it can be purchased by the barrel at a fifth of the cost of linseed.

It should also find its way into general use as a painter's oil. Whether or not a perfect dryer has been found for it, the writer is not sure, though he has seen specimens of painting when petroleum is used, apparently as fine as linseed paint, for house work, inside or outside. How well it will withstand the weather, time only will determine. If any one has a perfect dryer for it, the writer would be glad to know where to find it, and its owner.

P.

Randolph, Vt.

Expansion and Non-Expansion.

Messrs. Editors:—I do not wish to appear as an advocate of all that has been attributed to those who first suggested that there might be less economy in working steam expansively than is generally claimed. From the communication of S. H. W., page 122, current volume, and others I meet with, I find but few who understand upon what the argument of the "non-expansionist" is founded. We are yet in need of reliable testimony regarding this much discussed question, but until we are in possession of the necessary figures it may be of interest to S. H. W. and others to know what the theory of working steam non-expansively as well as that of expansion is, and then it may appear in a fairer light. I will illustrate it by the example given by S. H. W. Steam enters at 60 lbs. a given sized cylinder and is cut off at one-third of the stroke. I suppose this is 60 lbs. above atmospheric pressure. The average pressure during the stroke will be 35 lbs. Temperature at the beginning of the stroke is 311°, at the end 241°. Non-expansionists do not say that 20 lbs. worked full stroke in this cylinder will give the same result, either theoretically or practically; but they say, take a cylinder one-third the area of piston and the same stroke, and work 60 lbs. full stroke, and practically there will be a distance varying as the pressure of steam varies, probably a little in favor of expansion at high pressures, but growing in favor of non-expansion as steam is used at low pressures, and when arriving at the pressure generally carried by sea-going steamers non-expansionists assert that it will be found decidedly in their favor, taking all things into consideration. This is founded upon the fact that where the large cylinder is used there is about 75 per cent more condensation and radiation surface, more friction, more machinery, than where the smaller cylinder is used. Taken in this view, engineers, I think, will take a second thought before taking their experiments upon one cylinder as conclusive evidence of the fallacy of non-expansion.

In this connection, let me ask if you have any knowledge regarding the experiments instituted by the Navy Department to test this matter, and if those experiments have been completed and published.

A. F. Nagle.

Pittsburgh, Pa.

[Burgh agrees with our correspondent that unless steam of a pressure of 45 or 50 lbs. is used, the expansive power will not produce saving of fuel accompanied by power worthy of attention and productive of economy." The experiments referred to as instituted by the Navy department have not yet been concluded. We have some of the results, but shall reserve them for publication until the experiments are completed.—Eds.

The Crank Motion.

Messrs. Editors:—Notwithstanding it has been said in your paper that the description of the question of the alleged "loss of power" in the employment of the crank has been exhausted, I would like if some one or more of your correspondents would answer me this simple question: What is the average leverage of a crank 4 feet long as used in the steam engine?

While some contend that as the crank pin describes a perfect circle, at two points of which, called "right angles" it exerts a leverage equal to its length, to wit, 4 feet, and at two other equi-distant points, called "dead centers," it exerts no leverage whatever, and that, therefore, the average leverage must be one half the maximum, to wit 2 feet: others allege that the average is about 2 feet, 8 inches, but furnish us no data, demonstration, or proof thereof, and impliedly admit that it is impossible to do so, by using the indefinite expression "about" 2 feet 8 inches.

Can no one demonstrate exactly what it is, and make it plain to those unacquainted with the higher branches of mathematics?

There is no law of the land, or of mechanics, which limits inventors to the employment of one mechanical agency or power to the exclusion of all the others to produce any given result. For one purpose, the lever, and a certain species thereof in particular, is obviously the best adapted. For another purpose, the pulley is entitled to the preference. For still another purpose, the wheel and axle, screw, wedge or inclined plane, is the best. In some machinery two of these mechanical powers are employed; and in the steam printing press all, I think, are used; each severally being best adopted to accomplish the particular end designed. It is not, therefore, the superiority of one over another in the abstract that should be contended for, but its best adaptation to the end sought to be accomplished by the particular one used. When the advocates of the theory of "no loss of power" in the use of the crank, shut their eyes and ears to the advocates of the contrary, they do not mean to say that for many purposes the pulley is not better adapted, but only that for the particular purpose used, the crank cannot be excelled, or even dispensed with. My question reaches farther than that. Suppose that it is conceded that the average leverage of a 4 feet crank is but 2 feet, but that the crank is indispensable to bring up the stroke of the piston at a precise and uniform point, and without any injurious shock or concussion of the parts, then it is imagined that the question of the average leverage thereof is immaterial, because of the conceded necessity of its employment for the purposes last named. *Non sequitur.* Suppose that for the purposes specified the crank is indispensable; yet it may be possible to add another shaft to be called the driving shaft, to which is attached a pulley, or wheel and axle, or wedge, screw, or inclined plane, which, with the same leverage and quantity of steam, will give increased speed thereof, then the question of the leverage of the 4 feet crank with the quantity of steam used therewith, compared with one or more of the other mechanical powers named, becomes most important.

Hitherto it has been assumed that because all rotary engines have been failures, and that for a reciprocating engine, a crank or its equivalent, is indispensable, that the end of improvement of the steam engine has been reached. This is a great mistake. Let it be conceded that the half of 4 is but 2, and the ingenuity of our inventors will show you an engine upon a boat that will give far greater speed with much less steam of the same pressure.

P. Y.

Milwaukee, Wis.

A Perpetual Sunday.

Messrs. Editors:—On page 141, No. 9, current volume, Scientific American, there is an article headed "When and Where does the Day Begin?" In it there is more than one problem which Time can and will solve. I shall cite the article in question that I may explain my meaning, having placed the same within brackets.

"Evidently the day has a first beginning, and at the eastward. But how far and where? What are the people who first see the light of Monday morning?

"It is the sun which brings the day; where does he first bring Monday? [Nowhere—for he is still with Sunday, having received it from the Almighty when He said "Let there be light:" and as it is not at all probable that the sun did ever cease sending forth light, it is more than probable that the original first day is still in existence, especially when we know the light was hurled upon a rotary sphere.] If we could travel with him we might find out. [Indeed we might.] Let us suppose the case. We will take an early start; at sunrise on Sunday morning, with the sun just at the point of peeping over the horizon behind us, we travel westward. As we go, the people give us a Sunday greeting; we bring Sunday [sunrise if we have traveled with the speed of the advancing day] with us to Pittsburgh, St. Louis, Salt Lake, San Francisco. At San Francisco, our faithful chronometer informs us that we have been on the tramp about three hours. But we started on Sunday morning and it is Sunday morning still. [Certainly the exact minute you started, provided you traveled with the above-mentioned speed.] We go on, still on Sunday morning. [I guess you do; I have no recollection of you getting off.] Will this Sunday morning ever end?" [Your humble correspondent answers never. The sun has never set further than setting still, consequently no second day has ever been ushered in. "Time shall solve all things."

Undoubtedly many when they read the idea advanced, will say, the best thing for this individual is to shave and blister his head, or else furnish him with a ticket to Auburn. Now to all such I would reply that common courtesy does demand a patient investigation before condemnation.

"Old Sol."

New York City, March 9, 1867.

[If our correspondent really be the Ancient Luminary, we dare not argue with him. We hasten to declare that looking at affairs from his standpoint there is but a single day, and that is Sunday; Sunday forever! The turning of our little earth on its axis once in twenty-four hours, and the revolutions of ten thousand other orbs, all in different and inharmonious times, are of little consequence to him. "There is a time for all things:" which means, it may be supposed, that each planet for itself must determine and keep account of its days and seasons.—Eds.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Plow.—D. Peters, J. W. Pauly, Keokuk, Iowa.—This invention has for its object to so improve the construction of the plow that the power necessary to draw it through the ground may be diminished, and the wear upon the landside and bottom of the plow greatly lessened.

Cotton and Corn Planter and Harrow.—Charles C. Garret, Dayton, Ala.—This invention consists in combining or constructing a machine by which cotton and corn may be planted in drills or hills at any desirable distance apart.

Carding Machine.—O. F. Fitch, Morristtown, Ind.—This invention consistsin the construction and employment of a device which is to be attached to a wool carding machine in such a manner as to draw the electricity from the wool by means of conductors employed in close proximity to the roping.

Boots and Shoes.—Geo. W. Tolhurst, New York City.—This invention relates to an improved manner of strengthening the most exposed portions of boots and shoes and of simplifying the construction of the same. It consists in the arrangement of a combined heel, shank and counter which are molded in one piece of malleable iron or other suitable metal and in the manner of securing the upper of the boot or shoe and also the insole to the said metallic portion of the boot or shoe.

Auger.—Theodore Hofstatter, Jr. New York City.—The object of this invention is to provide an auger attachment, whereby it may be adjusted, to bore holes of any required depth, and whereby also when desired, the holes may be countersunk.

Governor for Water Wheels.—Oliver A. Kelly, Slatersville, R. I.—This invention relates to a governor in which the positions of the gate or valve is regulated by the action of two pawls and a ratchet gear.

Gage for Measuring the Strength of Main Springs.—N. A. Plympton, Northboro, Mass.—This invention relates to a gage by which a watch maker is enabled to compass the strength of different springs in such a manner that if spring the of a watch breaks, it is easy to find another of equal power to take its place.

Lantern.—Francis Leclere, Watertown, N. Y.—This invention has for its object to furnish a lantern in which the lamp can be attached to and detached from the lantern easily, quickly, and with one hand when necessary, and in which the wick can be raised or lowered as required without removing the lamp, or having a button projecting from the side of the lantern for this purpose.

Apparatus for Making Extracts.—Abraham Steers, New York City—This invention relates to an apparatus which is intended particularly for the purpose of inspissating extracts of tan bark or other fluids or extracts.

Attachment to Locks.—F. J. May, Morrisania, N. Y.—The object of this invention is to prevent the key if left in the lock when locked from being turned upon the outside of the door.

Window-sash Lock.—J. K. Clark, Mount Pleasant, Iowa.—This invention relates to an improvement in window-sash locks or fastenings and consists in a device secured to one side of the sash wherein two friction rollers are hung upon the ends of two connected levers in such manner that the rollers will spread apart and bear against the window frame so as to stop the movement of the sash at any desired point by gravitation, while by touching a handle on the connected levers the rollers may be withdrawn from the frame and the sash be relieved to move up or down.

Field Roller.—H. R. Crowe, Carondelet, Mo.—This invention consists in pivoting the central section of the roller in front of the two end sections in such a way that it can be removed and used by itself when required; in hinging the frames of the two end sections to each other so that the roller may accommodate itself to the surface of uneven ground; and in suspending the seat from springs attached to the frames of the roller in such a way that the seat may be supported whatever position the rollers may take in passing over uneven ground.

Hoe.—William H. Startzman, Big Lick, Va.—This invention has for its object to furnish an improved manner of attaching the handle to the blade of the hoe.

Caloric Regulator.—John Geo. Cooper and Edwin W. H. Cooper, Hartford, Conn.—This invention relates to a regulator in which the air, inclosed in a suitable heater and exposed to the action of the fire in the furnace, is caused to open and close a damper in the furnace door.

Tool for Cutting Boiler Tubes.—Richard Lavery, South Boston, Mass.—This invention consists in the arrangement of an eccentric cutter in a cylindrical head which is made to fit the tube to be cut and to which a revolving motion is imparted by a ratchet handle or any other suitable means so that by turning the cutter on its axis its point or tooth can be thrown back within the surface of the cylindrical head and if the head is inserted in a tube and turned in the proper direction, the tooth of the cutter, when once brought in contact with the inner surface of the tube to be cut, will gradually turn up and the tube will be cut by one revolution of the cylindrical head.

Cultivator Plow.—A. S. Barnewell, Savannah, Ga.—This invention consistsin constructing and arranging the shares of the implement in such a manner that weeds will be effectually cut from the sides of the rows of plants and the whole width of the spaces between the rows turned or worked over and the soil rendered light and pliable.

Cleaning Boiler and other Tubes.—John B. Christoffel, New York City.—This invention has for its object to furnish an improved instrument for cleaning or removing the scale from the interior surface of boiler and other tubes which shall be simple in construction, easily and conveniently operated, and effective in its operation.

Stereotype Plate-Holder.—Alexander T. DePuy, New York City.—This invention consists in having a block constructed of sections in such a manner that the sections may, with the greatest facility, be put together so as to form a block of any size corresponding to the plate which is to be secured to it, and the block, thus formed, be capable of bearing any desired or proper number of clamps or fastenings applied to it for the purpose of securing the plate to the block.

Shade Fixture.—John Cunningham Philadelphia, Pa.—This invention relates to a fixture for the cord of a window shade, the fixture containing a knob or pulley around which the lower part of the cord passes and by adjusting which the cord may be stretched where necessary and always kept in a proper taut state.

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SPRING BED BOTTOM.—Thomas B. Moore, Bridesburgh, Pa.—This invention consists in the construction of the springs and in the manner in which they are connected to the slats and to the frame of the bedstead.

STEAM AND AIR TRAP.—John Hague, Providence, R. I.—This invehtion relates to an improved method of relieving steam pipes and other pipes of confined air and the water of condensation.

CHURN.—Samuel S. Ayers, Plainfield, N. J.—This invention has for its object to furnish an improved apparatus, simple in construction, and by means of which a small amount of power will be required to perform the churning,

CORN PLANTER.—Josiah S. Rickel, Geneseo, Ill.—This invention relate to a corn planter of that class which is operated by the driver as the machine is drawn along by one horse only, and it consists in a novel and improved construction of the working parts, whereby the driver has full control over them, so that the seed may be dropped evenly in check rows, and the driver allowed to see each dropping, so that no hills can be missed or fail to have seed dropped into them.

MACHINE FOR BORING AND TENONING.—Thomas Place, Alfred Center, N. Y.—The object of this invention is to provide a labor-saving machine for the use of wheelwrights, by which, with the ordinary tools of the shop, the tenons may be cut on spokes, and the holes bored in fellies with dispatch and accuracy, so that they will fit exactly and may be put together to form a perfect wheel.

BRIDGE FOR BILLIARD TABLES.—Thomas Dolan, Albany, N. Y.—This invention relates to a bridge for use on billiard tables as a rest for the cue, the object being to construct the head piece of the bridge, in such a manner as to form bearings for the cue, which will allow the cue to be moved with perfect ease and freedom.

PUNCHING PRESS.—Oliver Snow, West Meriden, Conn.—This invention consists in a novel construction of wrist box for the wrist or driving crank that drives the tool-carrying slide or socket, whereby the distance between the driving socket is varied at will.

TAILOR'S PRESSING MACHINE.—Joseph W. Thorp, Sanbornton Bridge, N. H.—This improvement consists in an arrangement of levers and slides in connection with the handle of a tailor's goose suspended upon a crane, whereby the operator can impart with the hand any desired amount of pressure upon the cloth, or relieve it of pressure entirely by simply raising or lowering the handle without the employment of a spring or catch of any kind.

CONSTRUCTING LEVEES OR DIKES.—Louis S. Robbins, New York City.—This invention relates to a new and improved method of constructing dikes and levees to prevent the overflow of water,

CIDER AND WINE MILL.—E. S. Purdy, Croton, N. Y.—This invention relates to an improvement in that class of cider and wine mills in which rotary toothed cylinders are employed, and one cylinder made to rotate with a greater speed than the other. The invention consists in arranging the rows of teeth on the two cylinders in such a manner that the teeth of the two cylinders will pass each other at the point where the peripheries of the two cylinders are nearest each other, which, of course, is in the plane of the axis of the two cylinders. By this means the mill is rendered very efficient, the fruit being ground or grated in a thoroguh manner, and very evenly or uniformly throughout.

FID.—H. H. Pember, New York City.—This invention consists in forming the fid in sections, and in so constructing it in other respects as to receive and hold a ring or thimble of any desired size within its limit, so that as the cringle rope or cord is driven and forced over the fid, from its smaller to its larger end, such cringle will, when stretched thereby to the proper degree, fall or come into position about and around the ring or thimble.

CAR STARTER AND BRAKE.—John Wiley, 2d, South Reading, Mass.—This invention relates to a new and improved brake mechanism for railroad cars, so constructed that the device, when applied as a brake to retard the movement or fully stop the cars, will retain or hold the power which accomplishes that result, and be capable of giving it out or applying it in such a manner as to start or aid in starting the cars.

CULTIVATOR.—C. F. Megquier, Eureka, Ill.—This invention relates to an improved arrangement of the plows or the mode of hanging or operating the same, whereby the driver will have entire control over the implement, and with the greatest facility raise and lower all the plows whenever necessary and move the innermost ones laterally toward and from the plants.

TRAP DOOR.—Samuel R. Bartlett, Detroit, Mich.—This invention consists in attaching to trap doors, hatches, etc., a swinging arm, which shall by its own gravity form a stop to the door, thus affording additional security against accident.

CAR BRAKE.—J. H. Williams, Somerville, N. J.—This invention consists principally in interposing a spring between the brake shaft and the parts by which the brake shoes are brought to bear upon the car wheels, in such a manner that they will act to hold the brake shoes against the car wheels, and if relieved therefrom, to bring them to bear upon the same; the said spring, when the brake shoes are released from the wheels, being compressed, and so held in any proper manner, when being released by their reaction the brake shoes are brought to bear upon the car wheels.

COMBINATION LOCK.—Austin Leyden, Atlanta, Ga.—This invention consists in constructing a lock in such a manner that, in applying it to freight cars and to similar purposes, the car may be locked for through freight, and the destination of the car be indicated by a letter which is turned into position in the act of locking, and so that no way freight key for the same lock will unlock it.

CUTTING WOODEN HEADS.—Edmund Hersey, Hingham, Mass.—This invention relates to a machine for cutting the bottoms and heads of wooden boxes, measures, etc., and it consists of a cutter of peculiar construction attached to a rising and falling frame, and used in connection with a block over which the cutter works, and on which the stock or wood from which the bottom or head is cut, is placed.

HARROW.—Svan Svanson, Sweede Point, Iowa.—This invention relates to a harrow for pulverizing the earth after being plowed. The invention consists in a series of toothed rollers, placed in a frame, and arranged so as to operate in an efficient manner.

FIRE-ARM.—Alfred S. Munger, Chicopee Falls, Mass.—The object of this invention is to dispense with the use of a breech piece for receiving the recoil of the cartridge case when the fire-arm is discharged, and consequently all the necessary connecting parts and operations of opening and closing, and locking and unlocking; the hammer, by this invention, being so constructed as to receive and sustain the recoil of the cartridge when the fire-arm is discharged.

CISTERN FILTER.—George W. Lampson, Waterloo, N. Y.—This invention is to construct a rain-water filter, and adapt it to the conductor pipe of the building, so that the rain water shall be purified or cleansed before it enters the cistern.

BROOM HEAD.—H. B. Miller and M. P. Webster, Grand Rapids, Mich.—Patent dated March 12, 1867.—The case attached to the end of the handle and adapted to receive the broom corn is clamped between two bars whose teeth project through the case into the corn to hold it in position; the bars are coupled together by screws which pass through the case of the corn.

PRODUCING ILLUMINATING GAS.—W. G. Walker and R. F. Smith, Kilmarnock. Dated 12th July, 1866. This invention is carried out as follows:—The apparatus is that ordinarily employed at gasworks for producing gas from coal in the usual way, but in lieu of using coal as the origin from which the gas is evolved, a quality of peat, or other similar porous material, capable of itself of generating gas on the application of heat, is saturated with shale oil, or petroleum, or other mineral hydro-carbon. The material so saturated is placed in the ordinary retort and heat is applied, when the oil and the naturally combined hydro-carbons of the porous material are driven off in the form of an incondensable illuminating gas.

PRESERVING TIMBER FROM DECAY.—A. Prince, Trafalgar Square, London Dated July 13, 1866.—The patentee claims the application of crude petroleum, either alone or with mineral paint or pigments, for the purpose of preserving wood or timber of any kind from decomposition or decay, and from the attacks of insects.

MANUFACTURE OF LEATHER.—T. F. Gillot, Stoke Newington. Dated June 30, 1866.—The object of this tion is to utilize the refuse inner skins or parings of hides. To do this, the inventor subjects these skins to the operation of tanning, after which they are stretched and dried, placed together in layers, and cemented with a composition of linseed oil, litharge, resin, balm, wax, sulphur, and gum lac. Perfect adhesion is effected by subjecting the layers to pressure in a hydraulic press, a solid sheet of leather resulting, capable of being manufactured into boots or shoes.

PROMOTING COMBUSTION OF FUEL IN STEAM-BOILER FURNACES.—W. E. Newton. Aug. 1st, 1866.—This invention consists in forcing upward, by means of a fan, blower, or pump, one or more jets of cold air into the chimney or smoke pipe of the furnace. By thus introducing the air under pressure into the chimney at a point which is above the heating surface, a partial vacuum will be created in the fire chamber. and the air from the fire room will be made to circulate through every part of the chamber.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

G. R., of C. E.—You are right in your opinion that the pressure upon a boiler undergoing a hydraulic test is unequal. It will be greatest on that part of the boiler sustaining the weight of water, a pressure of a little less than half a pound to every square inch of surface, where the water is one foot deep, being the difference. Consequently a proper pressure gage will register more at the bottom of the boiler than at the top.

L. W. F., of Ind.—Bevel gears for driving machinery absorb more power than straight gears, for they change the direction of the power. Take two bevel gears in your hands and turn them together, then two straight gears of the same size and you can feel the difference. . . White lead and oil—a thick paint—or white lead skins, make as cheap a cement for joints in wooden boxes as anything we know where resistance to water is required. The box should be of seasoned lumber and the joints well fitted.

W. E., of Ky.—Your questions are somewhat indefinitely expressed, but as we understaud them we reply that the eccentric of an engine should staud ahead of the crank sufficient to compensate for the lap of the valve and whatever lead is desired. We cannot undertake to present a treatise on locomotive engines, such as you desire, in our columns, as it would occupy our entire paper to the exclusion of everything else. For information on this subject we refer you to "Burgh's Land and Marine Engines," "Bourne's Hand Book on the Steam Engine," his "Catechism,' and "Russell's Steam and Steam Navigation."

R. S. F., of N. Y.—We know of no cement better either for emery wheels or emery belts than the best glue. In an experience as a machinist of fifteen years we never found anything superior.

W. W. C., of Ohio.—You ask whether there is not danger that the pressure of the column of water in the vertical shaft of the lake end of the Chicago tunnel will exert such a force as to break the walls of the horizontal portion, and thus ruin the work. We reply that the brick masonry is seated hard against the solid clay, forming the bed of the lake, in every direction. This clay must give way if the masonry does. Suppose a leak from the inside occurs on account of the pressure against the walls, the water thus escaping on the outside will, of course, exert the same amount of pressure as that on the inside and thus equalize the pressure on both sides, outside and inside. *Vide* "Silliman's Philosophy" for the pressure of liquids. The most eminent engineers in the country were employed on the construction of the Chicago Tunnel, and E. W. Smith, the consulting engineer, informs us that no accident such as you fear is possible.

R. W., of Ill.—We can see no insuperable objections to your plan for an elevated railway propelled by an endless rope, but it is not in any radical point different from others which have been repeatedly proposed.

J. H. P., of N. Y.—The diamond appears to be especially adapted to glass cutting. Other substances can cut, or rather abrade and wear it, but none which will produce a scratch which upon pressure will make a rupture in the line of the mark. Quartz crystals will scratch glass but not retain an edge, and the scratch made by them appears entirely different, under the microscope, from that made by the diamond Fine steel can be hardened so as to cut glass but it will not retain its cutting edges or corners. The process is simply that of heating and plunging into a cold bath. . . . You can mend your iron kettle with a cement made of iron filings, fine, one hundred parts of weight to one part sal-ammoniac dissolved in urine to proper consistence; or four parts filings two of pipe or potter's clay, and one of ground crockery fragments, made into a paste with flour and water.

A. D. G.—Your solution of "cupsammonium" was probably not strong enough. You may concentrate it by evaporation. The second method of preparing the soludon is not a good one. You will find old cotton cloth or paper more soluble than wood fiber. Another solvent of vegetable fiber is a strong solution of chloride of zinc in water.

J. M. S., of N. Y.—Your idea of hydro-popuIsion is not new. If we understand you the proposition is to produce, by mechanical means, the power to drive the screw. In other words you would lift water into the ship, change the direction of its flow, and use the column thus diverted against the buckets of a turbine. Will not the power of engine thus absorbed be so much taken from that which might be directly employed in driving the screw.?

M., of N. Y.—You ask whether the method of driving machinery by friction wheels instead of belts is superior. You misunderstood our statement. We were speaking of changing the direction of power as by bevel gears, for which the bevel friction wheels are a substitute, as they run easier and without noise. We do not know if this device is used in New York city, but it is extensively employed on gun machinery.

W. De. S., of Pa.—You are correct in supposing that a hydraulic cylinder whose bursting force, by the action of the pump, is a certain pressure to the square inch, would not stand the same pressure if instantaneously exerted as by the explosion of gunpowder. Reasoning from analogy would prove this. A sudden blow will rupture any substance which might withstand much greater force exerted gradually, as a pressure.

F. C. H., of Pa.—Our advice to you is to drop your attempts to produce perpetual motion. Any thesis on this subject involves the violation of the laws of nature, more immutable than those of the Medes and Persians. While we are ready to assist all who attempt mechanical improvements legitimately, we cannot waste our time or encourage a delusion by publishing plausible theories which have been over and over again proved to be without foundation.

J. T., of Pa.—It is an old idea to propel vessels by the intermittent ejection of water at the stern.

H. W., of Pa.—Your device for preserving butter, meats, etc. is we think patentable.

W. M. M., of Wis.—You can include several improvements upon one machine or instrument in one caveat, but not in one patent unless they are all connected in their operation. Perhaps a hot wire quickly put around would crack off the bottles as you desire.

C. C., of Pa.—The varnish you need for your brass and plated goods is shellac dissolved in alcohol. The articles should be slightly warmed when dipped. The tendency of a spirit varnish to chill or give a rough surface may be destroyed by adding to the varnish a little gum sandarac, oil of lavender, or concentrated ammonia.

W. C., of N. Y.—The hight to which a liquid will rise in a capillary tube varies both with the nature of the tube and the liquid. To secure the greatest movement the liquid must be mobile and there must be an adhesion or attraction between the liquid and the tube. Water in a glass tube two fifths of an inch in diameter will rise 12 inch. In tubes of different diameters, the hights of rising plus one sixth of the diameters wil be inversely as the diameters. The capillary force never raises the water so as to overflow the top of the tube. But the top of the tube may terminate in a siphon and thus a liquid may be carrried over the sides of a vessel. Water rises in a vacuum by reason of the pressure of the air to about 34 feet, aud by capillary attraction it may be litted some distance higher. You need actual experiments to determine the precise efficiency of your gutta-percha tubes stuffed with fiber.

H. E. C., of N. Y.—One pound of sulphur, by burning in the air, produces two pounds of sulphurous acid. Therefore, the cost of sulphurous acid is not a serious objection to its usefulness. . . . The original and first inventor is often entitled to a patent notwithstanding a publication of the invention at home or abroad.

C. M. S., of Mass.—The color of glass is due to metalic oxides. If you take colorless flint glass you may give it any desired color by melting with it a small quantity of the appropriate oxide. Oxide of cobalt gives a blue color, uranium a yellow, gold a red, and in fact nearly all the oxides will give tints peculiar to themselves. The green of ordinary bottle and window glass is due to the oxide of iron.

H. L. S., of Minn.—The impression of a coin which has become faiut or even invisible by long wear, will be revived by heating it to a low red heat. If the coin be heated and cooled several times it will be found that the impression will show itself in relief, the sunk or compressed part of the coin will become thicker.

C. S. W., of Tenn.—We understand from your description that under your boiler (25 feet long, return flue) there is a flue space 2½ feet deep the whole length. This flue space seems to us quite too large. We suggest that by filling it up to within 12 or 15 inches of the bottom o the boiler, the draft will be greatly improved, and your fuel will be burned more economically.

J. M. O., of Ill.—For an ink powder take 1 lb. nut galls, 7 oz. copperas, and 7 oz. gumarabic. Pulverize and mix. This amount of ink powder will make one gallon of good black ink. Two or three powdered cloves should be mixed with each pound of powder to prevent molding.

E. R., of Vt.—The following rule applies to your case. Extract the square root of the head or depth of water measured in feet and multiply it by 54; this gives the velocity in feet per second. Multiply this velocity by the area of the orifice in feet, and you have the number of cubic feet which flows out in one second.

J. J., of N. Y., condemns the practice of extinguishing a lamp by blowing down the chimney. If there is an explosive mixture in the lamp it is in this way easily ignited.

J. F. D., of Pa., wants a good receipt for brass to be used for fine castings and to work well in the lathe. 1. An excellent red brass. Copper 24 lbs.; zinc 5 lbs.; bismuth 1 oz. 2. A cheap yellow brass for turning: copper 20 lbs.; zinc 10 lbs. lead 1 oz. Melt, and stir in the lead just before pouring.

R. L., of Ky.—Picric acid is used in dyeing on silk and wool for yellows and greens when great stability and brilliancy are desired.

S. T. R., of N. J.—Beet sugar and maple sugar when thoroughly refined, cannot be distinguished from refined cane sugar.

J. G. F., of Minn.—One of the plans of testing a steam boiler is to nearly fill it with water, and increase the pressure by means of a pump. The ordinary gages indicate the pressure. It would be impracticable to determine the pressure by a column of water, as you require an addition of a little over two feet in the hight of the column, for each increase of one lb. of pressure. To give a pressure of 30 lbs. in the boiler would require a water column of about seventy feet in hight. The diameter of this column has no effect on the pressure. A pipe the size of a pipe stem would be as efficient as one a yard in diameter.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Wanted.—Best wool carding and spinning machines and power looms. Manufacturers send circular and price list to C. Picard & Co., Nebraska City, Nebraska Territory.

Manufacturers of House-furnishing Goods (Hardware) will please send their address and circulars to S. W. Johnson & Co., Detroit, Mich.

Coil Spring Manufacturers inquired for by James R. Laurent, Milford, Pike county, Pa.

Wanted.—Engine lathe, screw feed, 10 to 13 feet bead, 24 to 28 inch swing. Also one smaller. Address with price and description, Henderer Brothers, Binghamton, N. Y.

J. M. Lewis, Box 245, New Orleans, La., asks for a gas burner styled the American Gas Multiplier. Persons knowing of it, will please address him.

NEW PUBLICATIONS.

A NEW TREATISE ON GEOMETRY, Plane and Spherical Trigonometry, and Mensuration of Surfaces and Volumes; Accompanied by Logarithmic and other Useful Tables. By Charles Baillairge. Quebec: C. Darveau.

Founded on the works of Euclid, this treatise, by abridgment, substitution, and rearrangement, reduces the number of theorems and problems, by one-half. A new and universal theorem or expression is given for finding the solidity of all elementary bodies, whether prisms, cylinders, pyramids, cones, or frustrums of either, spheres or segments thereof, wedges, etc. Also, rules for determining the exact volume of irregular bodies, and the specific weight of any body. This volume is in the French language, but an English translation will soon appear.

FERMENTED LIQUORS; A Treatise on Brewing, Distilling, and Rectifying of various Spirits and Vinegar. By Dr. Lewis Feuchtwanger.

In addition to the subjects embraced in this comprehensive title, the work treats on Hygiene, and in the concluding portion, contains a large number of useful receipts and descriptions of new alloys employed in metallurgy, chemicals used in ambrotyping, artificial guano, artificial gems, cements, inks, and varnishes, and other preparations useful to the druggist, chemist, and mechanic.

NARAMORE'S UNITLD STATES TREASURY AND BANK NOTE DETECTOR.

The above work is published with the official sanction of the Secretary of the Treasury, by the American Photograph Co., of Bridgport, Ct. It is designed to supply the people of the country with a *fac simile* of the genuine plates of the various denominations of Greenbacks and National Bank Notes, and thus to give them a sure protection against altered notes and counterfeits. The Americal, Continental, and National Bank Note Companies, in whose custody the proof sheets were kept, on the receipt of the official order, appointed agents to accompany the proof sheets to the artist's gallery, and to take account of every negative taken from them, not allowing the proof sheets to go out of their sight for a single moment. It was also required that the photographs should in all cases be not more than one fourth the size of the genuine notes. The proof sheets are the first impressions taken from the plate after it has been completed, upon pure white paper, of a spongy nature, prepared expressly to take a perfectly clear and accurate transcript of the plate,

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Improvement in Wind Wheels.

The general appearance of this wind motor can be understood by the engravings, although a brief explanation of its parts may be necessary. It is a self regulating machine capable of being run at high or slow speed as may be desirable, depending, of course, on the power of the wind. The platform, A, is centered on the shaft, B, but rests on an annular railway, C, on the frame, on which it traverses, bearing on rollers. By means of a suitable vane on the top and end of the structure—not shown—and this railway it can be kept with one end always facing the wind. Fig. 2 gives an idea of the plan of the platform, and the arrows show the direction of the wind. It will be seen that the two ends of the platform are beveled off to a point. The parallel sides are enclosed by lumber, supporting the roof, which is of similar shape with the platform. In Fig. 1 the side nearest the observer is removed to show the interior. There are two vertical wind wheels supported on shafts between the platform and roof, the wings or buckets of which are either radial or curved. These wings nearly approach and the wind acts on those nearest the respective sides of the structure. At D, Fig. 2, are hinged two doors, E, connected by levers working a sliding block traversing on proper vertical slides, as seen at F, Fig. 3. These doors deflect the wind against the wings of the wind wheels. As the doors are expanded the wind will impinge upon the outer edges of the wings, having diminisned force; while as the doors are brought together the wind will be directed to a point nearer their centers, thus increasing the motive force of the wind wheels, according to the inventor.

Motion to the horizontal driving shaft, G, is imparted through the upright shaft by bevel gears or any other suitable device. The regulation of the speed of the wind wheels is effected through the opening or closing of the deflecting doors, E, which is done by means of the horizontal lever, H, and the connecting bar, I, which engages with the sliding block and by its reciprocating upward and downward movement, through the medium of the connecting levers, J, opens or closes the doors. The horizontal lever, H, is connected with the governor, K, by an upright bar, J, and the governor with the wind wheels by proper gearing, seen plainly in Fig. 2.

The operation is simple The platform is kept by means of the vane with the point, D, facing the wind, which, passing by the deflecting doors, is thrown against the wings of the wheels giving motion to their respective shafts, connected by the gearing which also gives motion to the governor, and thus, by the levers hereinbefore described, opens or shuts the guiding doors as before shown. By these means the velocity of the main driving shaft approximates a uniformity of speed. This device was patented Nov. 20, 1866, through the Scientific American Patent Agency by J. C. Fay, who, if addressed care of Fay & Co., 47 Pearl street, New York City, will furnish any additional information desired.

Fig. 1

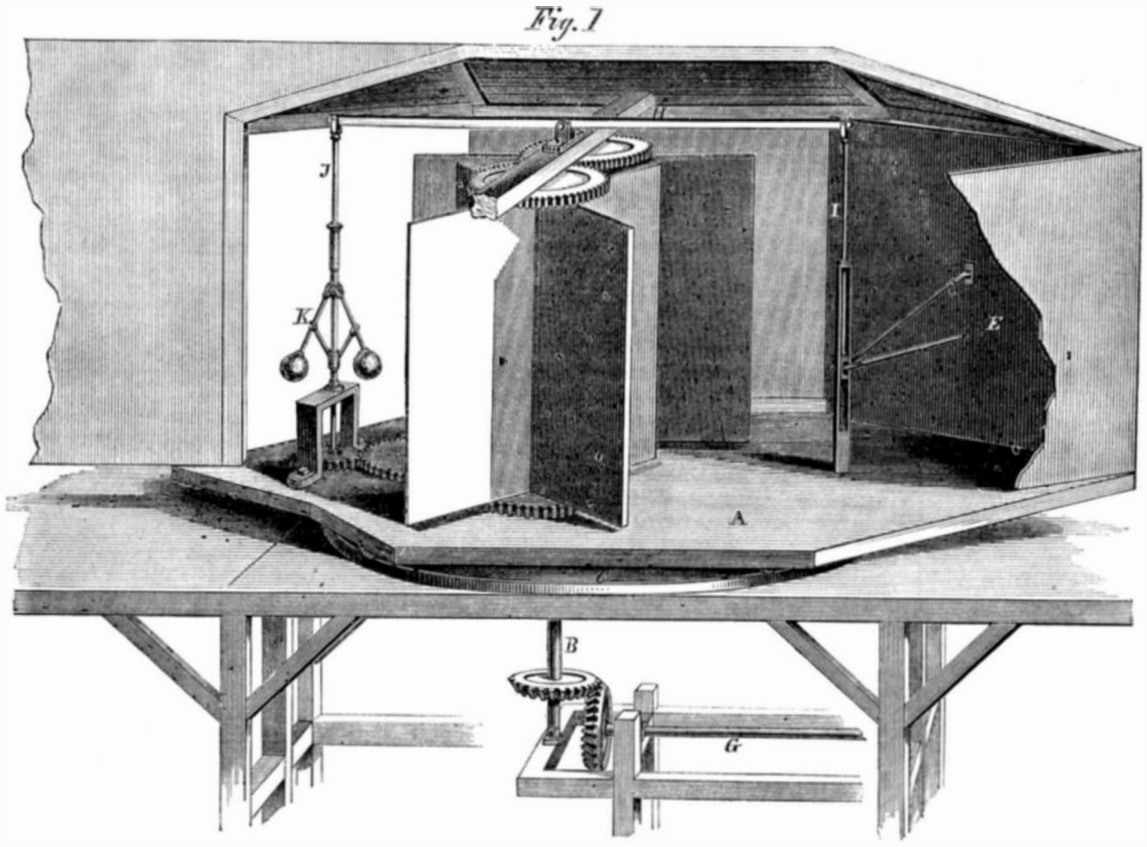


Fig. 2

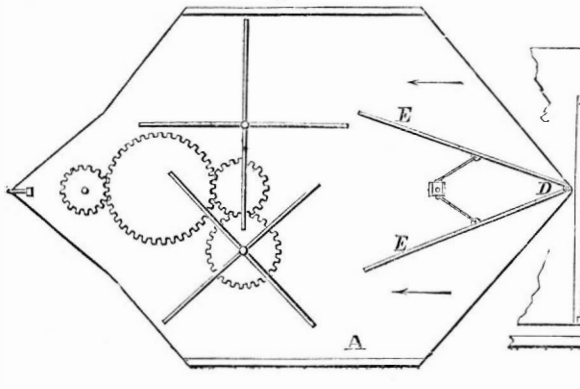
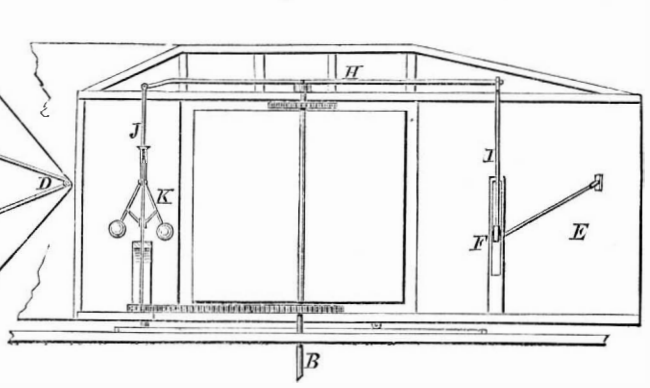


Fig. 3



FAY'S IMPROVEMENT IN WIND WHEELS

A Young "Inferno."

The Iron Works at Barrow-in-Furness, by the natural advantages of their position, and the grand scale and symmetrical simplicity of their arrangement, seem to be fitted almost to defy competition. They are situated on the shore, projecting their slag constantly farther into the sea and forming new and valuable land as sites for workshops and additional furnaces. Railways with improved coal and ore cars bring all the materials of the manufacture direct from neighboring mines, and minor railways on inclined bridges carry them to the tops of the blast furnaces. Practically unlimited capital applies every possible arrangement of economy in point of method or scale of operations, regardless of present cost, for the most profitable working in the long run. A reserve of 40,000 tuns of coke is kept in stock, to guard against any possibility of interruption by mining accidents or strikes.

Eleven blast furnaces are completed, thus far, standing in a straight line, each a gigantic cylindrical column, 56 feet high and 16½ feet in diameter, with the base of its pedestal formed by a circle of massive iron pillars; the whole united by their capitals in a grim porch worthy of some temple of Titans. A series of inclined railways carry all materials from the mixing sheds to the great roof where they are dumped into the fiery throats of the furnaces. We had thought to complete our picture with a rolling canopy of mixed smoke and flame, carrying the dark pile to the clouds. But no: the gases are entirely "taken off" the tops of the furnaces, and conducted away to be consumed under the boilers and hot-blast ovens, all of which are heated solely by these waste products which formerly served but to darken the sky and light up the night.

Each furnace has six tweers 2½ to 3½ inches in diameter, through which a blast heated to 600° or 650° is impelled at a pressure of 3 to 3½ lbs. to the square inch. There are thirteen blowing engines, with 30 to 52-inch cylinders, and with blowing cylinders of 72 to 100 inches diameter and 9 feet stroke. Four winding engines serve the four inclines for charging the furnaces. Forty-two boilers, all fired with the waste gases, supply steam to the different engines.

Each furnace is tapped every six hours, or four times in the day, and at each tapping runs off 40,000 lbs. of iron, or 560 tuns a week—all together over 6,000 tuns—into the pig beds which are arranged with the same convenience as everything else in the system, so as not only to receive the molten stream direct from the furnace, but to deliver the product direct upon the cars that take it to market without so much as changing its level. A large proportion of this vast amount of metal is used by the Barrow Hematite Steel Company, whose works are adjacent, in the manufacture of Bessemer steel. The whole works (remarks *Engineering*) are at present in the state of rapid growth. Understood as a beginning, merely, we have no hesitation in saying that the establishment we have outlined will "do" for the present.

The Grave and Granary of Life.

Putrefaction is probably not death but the contrary; the life that follows death—a sort of resurrection. Death seems to be as repugnant to nature as any other loss. The law of conservation and conversion applies to vital as well as inorganic forces. M. Pasteur has shown that the animalculæ into which not exactly the soul but the vitality of the dead organism transmigrates (and so far as this Pythagoras and the Brahmins were right after all) named *mucedines* and *bacteria*, occupy the atmosphere generally, and it may not be long before some vital relation may be discovered between them and all the re-ascending scale of organic powers that feed upon the air. These animalculæ may prove the primary reservoir from which animal life proceeds and to which it returns. The latter half of the supposition appears to be already proved. Fermentation or putrefaction is a vital process, reciprocally generated by and generating inconceivable millions of impalpable organisms, which charge the atmosphere and are everywhere at work, transmuting dead organisms into elementary living ones—and why not passing on the vital activity into higher forms?

Heavy Oil.

The pitch lake in the Island of Trinidad is one or two hundred acres in extent, and consists of a penetrable but tenacious pitch, of uncertain depth, being too dense for any kind of sounding, and yet not hard enough to sustain excavation. The pitch is mined out and shipped in large quantities to Europe, but closes over the chasms as fast as they are made, and appears to be fed from an inexhaustible "well" beneath the bottom of the lake. The English manufacture oil from it.

Telegraph Wire Drawing.

Messrs. Johnson & Nephew, Manchester, have drawn for the Paris Exposition, with Bedson's patent "continuous mill," a telegraph wire rod of No. 3 gage, 281 lbs. weight, and 530 yards long, direct from a single billet, at a single heat, without a weld or break. The billet, 60 feet long, was heated in seven minutes, and passed through the "mill" in three minutes more. The manufacturers are now building a furnace of size and shape to deliver heated billets of still greater size, and thus produce still more extensive lengths of wire for telegraph purposes. Their ordinary drawing is in lengths of 80 to 100 lbs., at the rate of 100 tuns per week.

In the patent continuous mill, pairs of grooved rollers are placed alternately horizontal and vertical, in a series of diminishing diameters of groove, each pair geared to run with an addition of speed proportioned to the drawing-out of the wire in length. The pair nearest the mouth of the furnace receives the end of the heated bar and draws it slowly forth, passing it through into the jaws of the next forward, and so the long tapering worm of glowing metal creeps onward faster and faster, until at last it coils itself upon the drum at the end of its course. By the addition of smaller grooves to the series, it is now intended to make smaller sizes at the same heat, and take off any gage at will by simply diverting the wire to a drum at the proper stage of its progress.

After passing through the mill, the wire is galvanized by being drawn at a red heat off one drum and upon another, passing through two successive baths between the drums; the first of hydrochloric acid and the second of molten zinc. It is then straightened and stretched by reeling off one drum upon another of the same size going two per cent faster, and passing, on its way between the two, in a serpentine manner and of course at a high tension, between pins set in a straight line with its course.

The wire works at Worcester, Mass., on the old plan, are capable of producing 3,000 tuns per annum, or 400 miles per week, of telegraph and fence wire, No. 9. In this establishment, the metal is first drawn from blooms to billets, then from billets to ⅜ inch rods, then annealed, and finally reduced to wire by cold drawing through funnel-shaped steel dies, with repeated annealing between the successive sizes.

Revolution in "Shoddy."

It is reported that a new machine about to be introduced in England ravels (not tears in pieces) all fabrics, and reproduces the fiber, whether of wool, cotton, linen or silk, of the length in which it exists in the scrap operated on. The value which this utilizing process must add to rags of all kinds, may be partly computed from that imparted to woolen rags by the miserable work of the well-named "shoddy devil" (an unmitigated imposition upon mankind) which by tearing woolen rags into dust from perhaps one-hundredth to one-half an inch long, to be worked into the appearance of cloth, raised the price from $20 to $200 a tun. If the improved machinery be all that it is represented, garments of silk and wool will soon be re-manufactured nearly as good as new. It certainly seems as if means to this end must be within the ingenuity of man. The threads of the woof are neatly taken off the warp by fine hooked teeth of steel covering a cylinder which revolves at great speed, the edges of the rags being fed, not too fast, against it. The fiber falls at the end of the machine in long fleecy flakes, the warp coming out one way and the woof another, so that if of different material or quality, they need not be mingled in the product.

BRITISH LOCOMOTIVE WORKS.—An English paper gives a partial list embracing over thirty establishments capable altogether of turning out at least 1,500 locomotives annually, of which 1,000 are required on the English railways.

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Contents:

(Illustrated articles are marked with an asterisk,)

*New System of Aero-Locomotion 197
Sodium—A Scientific Canard..... 197
Harrison Steam Boilers..... 198
Iron Works in Alabama 199
Editorial Summary..... 199
*Improved Horse Rake 200
Gold Hunting and Geology..... 200
Why a Belt Runs on the Largest Diameter of a Pulley..... 200
Our Navy—One Step in the Right Direction..... 200
What is Clay? 201
*Harris & Browning's Spring Friction Nuts..... 201
*Exploding Force of Cylindrical Boilers 201
Beet-root Sugar Machinery..... 201
Safety of Kerosene Lamps 202
The Uses of Heavy Petroleum 202
Expansion and Non-Expansion.... 202
The Crank Motion 202
A Perpetual Sunday 202
Recent American and Foreign Patents..... 202
Answers to Correspondents..... 203
New Publications 203
*Improvement in Wind Wheels... 204
A Young "Inferno"..... 204
The Grave and Granary of Life... 204
Telegraph Wire Drawing..... 204
Revolution in "Shoddy"..... 204
Advantages of a Practical Knowledge of Mechanics to Inventors 205
The Management of Boilers—Explosions 205
Patentees at the French Exhibition 205
Credit 205
A Grammatical Problem 205
Probable Influence of the Internal Revenue Laws upon Invention 205
British Steamships and Marine Engines 206
Patent Claims.....206, 207, 208, 209
*Improved Hand Stave Jointer ... 212
The Sun's Spots—A Discovery..... 212
*A Superior Cap for Mucilage Bottles 212
Prices and Wages 212

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK ROW, and not at No 39.

ADVANTAGES OF A PRACTICAL KNOWLEDGE OF MECHANICS TO INVENTORS.

As there are natural mechanics so there are natural inventors, and yet the two are so closely allied that it is difficult to draw the line of distinction. The mechanic may be successful in his department without that peculiar faculty of investigation and restless desire for making improvements which mark the inventor. But the inventor must share with the mechanic in constructive skill, at least of brain, if not of hand. Without this he would be merely a puller-down of other men's structures without the power to build, and at the best with only the ability to suggest improvements.

Now it is one thing, and a comparatively easy thing, to detect and point out the faults in a machine, but it is quite another and a far more difficult thing to remedy those faults, or to instruct others to do it. This is the inventor's department, and if he has the faculty of seeing not only where the wrong is, but discovering the right—if he can make a valuable improvement on a machine which before appeared complete, compassing all its details—he deserves the title and the reward.

And it is in this attention to details as much at least, as in the discovery of the principles of an improvement that the usefulness of the inventor is manifested. Between the first crude conception of a machine, or of an improvement on a machine, and its actual successful ultimation is a long road—not seldom a rough road. It is beset with obstacles which must be removed, or the inventor must retrace his steps and outflank then, a process sometimes involving the surrender of all he has already accomplished. It is often disheartening, but if the principle upon which the improvement is based is correct and the inventor has a sufficient amount of the necessary quality of persistence, he will in time overcome all the enemies to his progress and emerge from the contracted and gloomy ravine of endeavor into the level plain of assurance and the sunshine of success.

But he should have practical knowledge as well as speculative genius. While he holds to his idea he must ascertain whether he can reduce it to practice. And to do this it is not always necessary that he should be thoroughly acquainted with that department of industry for the improvement or which his idea is designed. In fact, many of the most valuable improvements which have blessed mankind have been made by men who had no practical acquaintance with the department of the arts which their inventions have advanced. But the inventor must have been a practical man in another sense. He must have been acquainted with the properties of matter and the laws of mechanics practically. Still many inventions which were first put forward as suggestions, have been made valuable by men who, not possesing the far-seeing qualifications of the original propounder, have by their knowledge of the necessary manipulations put these suggestions into living, active forms.

From these remarks the necessity, or, at least, the advantage of a knowledge of the properties of materials and the use of tools to the inventor is apparent. If the inventor, possessing what he considers a valuable idea, will, by visiting the shop of the mechanic, post himself in these necessary branches of knowledge he will find his "exceeding great reward" in a more rapid ultimation of his speculations into acting realities. We have known a natural inventor, without any practical experience in the use of tools or the manipulation of materials, to spend months in a shop doing the roughest work, but keeping his eyes open, in order to get the necessary knowledge by which to perfect his invention. It is an old saying that "if you want a job done do it yourself," and any one who has been compelled to direct another how to carry out his own ideas, being himself ignorant of the necessary means to the end, knows that he must expect to be misunderstood and to be compelled to sustain repeated failures.

Really, there is more depending upon the details of a mechanical improvement for its success, than upon its essential idea. Perhaps we state the case too strongly, but from the experience we daily have in the examination of models, some the workmanship of which would almost disgrace an Australian, although like Shakespere's toad, which "Ugly and venomous yet bears a precious jewel in its head," they bear the grand idea in a villainous looking carcass, we think we are justified in the assertion.

THE MANAGEMENT OF BOILERS---EXPLOSIONS.

We have received through Mr. W. P. Slensby, of New York city, an article on boiler explosions which contains some statements worthy the attention of those who have steam boilers in charge. Owing to the press of matter on our columns, we have not room for the communication in its entirety, but give the principal points.

He ridicules the idea that explosions are inevitable, and that they cannot be prevented. Steam is a powerful but governable element, not a mysterious or unknown power. The great cause of explosions, in his opinion, can be laid to the material, workmanship, size, and form of the boilers. A small boiler will withstand more pressure to the square inch than a large one, and a cylindrical boiler, than one with flat surfaces, unless the latter is well stayed with bolts. The bottoms of large boilers are subjected to from three to five pounds more pressure to the square inch than the upper surfaces, owing to the weight of the water.

When a portion of a boiler becomes red hot its strength is impaired and it is in a state to yield to a gradually increasing pressure and also to a suddenly produced force similar to that generated by the metamorphosis of a solid into a gas. When the solid body of the water gets below the iron surfaces exposed to the heat of the furnace there remains a foaming matter composed of about one-third water, and two thirds steam, a thick, saturated, moist steam, incapable of keeping the iron cool, but capable of being expanded by the heat into superheated steam very rapidly. Thus lowness of water decreases the strength of the iron and increases the pressure of steam.

The idea that if a portion of a boiler begins to give way he rupture acts as a safety valve is not correct. When the ron begins to go it requires much less force to complete the rupture, just as when forcing the hand through a sheet of strong paper, if the material be once parted, very little force is required to send the hand through.

The deposition of scale preventing the water from reaching the iron is another cause of explosion, although the water may be retained at the requisite hight.

Suddenly opening throttles when starting should never, except in cases of great emergency, be practiced. It is similar to firing a gun by letting the steam rush suddenly by at a high pressure into the cylinder. It there meets with an opposing force, and like the exploded gas in a gun, recoils with a force similar to that with which it struck the piston.

Boilers should be cleaned as often as once a month, and if the water is very dirty, more frequently, as the dirt held in solution does not pass off with the steam, but is deposited.

A boiler will make steam faster when the pressure is high than when it is low, with the same fire, so it is economical to carry a high pressure—even if it is not necessary to do the work—and to work the steam expansively.

Steam engines running at high speeds return a less percentage of power in proportion to the steam used than engines running slower, as high velocities decrease the power of the steam.

Tubular boilers make steam faster with less fuel then others, and if properly constructed and cared for will last as long.

The crank pin of an engine travels over one-third faster than the piston, which accounts for the unevenness of the power at certain parts of the stroke. The piston is never at half stroke when the crank is vertical.

PATENTEES AT THE FRENCH EXHIBITION.

The French minister of agriculture, commerce and public works, has written a letter in which he states that foreign manufacturers who have secured patents in France and who wish to introduce similar articles for exhibition, must first apply for authority from him pursuant to law, in order not to lose their patent rights.

The minister also states that a bill has been drawn up to authorize the issue of certificates of patent protection, which he hopes will be adopted.

In regard to the question of placing the articles on exhibition, the declaration of the minister confirms the views expressed by us on page 403 of our last volume. Exhibitors should not only apply for permission to exhibit, but they should also protect their rights by patent.

CREDIT.

The *Mechanics' Magazine*, London, says "'Quien Sabe' hands the following method of cleaning a foul gun to the *American Railroad Journal*." It should read the "SCIENTIFIC AMERICAN." The article was written for and published in this journal on the 22d of last Dec., page 426. Our able cotemporary *Engineering* gives credit to another railway journal for information about steel-headed rails which was originally borrowed from the SCIENTIFIC AMERICAN without credit. We do not like to have our labors credited to other journals.

A GRAMMATICAL PROBLEM.

A university philologist writes us in favor of forming the possessive case of substantives by the addition of *'s*, regardless of a sibilant preceding. Much may be said, and abundant authority cited, in favor of both the modes in use: *e. g.*, "Davis'" or "Davis's." Where the weight of argument and authority is thus divided, it is best not to dogmatize. We have, however, for our own part, a general aversion to surplusage in words, letters and points alike; and although it is not half so easy as some think, to attain a perfect or even consistent literary correction of newspaper proof, with all its variety of writers and correspondents, a tendency to drop whatever can be spared without loss will generally be recognized in these pages.

Intelligibility is the great virtue in printed signs; and if "Davis'" convey the right impression as readily as "Davis's," and to as many readers, an abortive show of theoretical precision, unattainable here at any rate, should not tempt us to prefer the clumsy to the terse expression, where no real violation of etymology is involved. As to the etymology, there is no room for dispute: as the double method is not in itself expressive of any additional sound right or wrong, and both concur in merely preserving a reminiscence more or less faint of the original possessive *his*: as "John, his book." Whether we shall suppress and represent by an apostrophe the three letters *his* or only the two letters *hi*, is but a question of taste and convenience, not of accuracy. If etymology absolutely requires any of the letters to show, it requires all, and remands us to the full *his* in singulars and *their* in plurals.

For a positive argument, on the other hand, the short possessive is the more consistent. The possessives of all plurals, of all "common nouns" ending with sibilant letters, and of all proper names ending with *z*, are naturally so formed by everybody. It would be very strange to see in print or hear in speech "the brewers's committee" or "the Lelands's hotel" or "mechanics's tools" or "Agassiz's lecture." We don't believe in following a rule as printers are sometimes pledged to "follow copy—if it goes out of the window:" but it is quite as well, *ceteris paribus*, to adopt a rule that can be followed. To form the possessive by attaching to a final sibilant letter the apostrophe, and to all other terminations *'s*, is a rule meeting all cases that occur to our memory, and generally coincides, just where the rival rule generally does not, with the better style of pronouncing possessives.

[For the Scientific American.]

PROBABLE INFLUENCE OF THE INTERNAL REVENUE LAWS UPON INVENTION.

The boundless resources of this country and the stirring energy of its people have developed more improvements and useful inventions in any given time since 1836 than can be shown by any other country of the world. The records of the various patent offices of Europe and America establish this fact beyond the necessity of further proof.

But this development of our industry and skill has taken place for the most part during a period of light taxation consequent on the small expense of national government. A huge national debt, an imposing navy and a large standing army have somewhat altered matters: still we are of opinion that a revenue many times greater than what is needed for the purposes of government might be raised without any sensible inconvenience to the community.

We much fear that advantage has been taken of the necessity for raising a large revenue, to impose a system of taxation upon the people the effect of which is not only not to raise but to diminish revenue, and more serious still, to impose trammels and restrictions upon trade, agriculture, and manufactures, calculated to paralyze (if anything can) the wonderful fertility of our resources.

But it is in the bearings of the existing fiscal system upon science and art, and especially upon industrial inventions, in which our readers—as readers of the SCIENTIFIC AMERICAN—will be interested, and leaving the commercial and international aspects of the subject to other students, we purpose to inquire how the progress of discovery is likely to be affected by the internal fiscal system adopted by Congress.

Let us appeal awhile to the history of England—to "philosophy teaching by example"—a history fertile in blunders from which we might so readily take warning, and let us take paper as an example.

Most of our readers are aware that until late years the London *Times* might be regarded as almost the sole exponent of public opinion in England, and that excise and custom laws prevailed by which a tax was imposed on all paper manufactured in Great Britain and customs duties on all paper imported.

The influence of the London *Times* had its origin in the energy and ability of its chief proprietor, the late Mr. Walters: but it retained it when, having the governing class for its supporters, the very condition of its existence rendered it the advocate of nearly every sinister interest in the United Kingdom. It owed the retention of its influence to the pernicious effects of the excise laws upon paper, which narrowed the supporters of the press to the wealthy, and rendered all healthy competition impossible.

The proprietors of the *Times*, partly foreseeing, but also in a degree misjudging, the consequences of the repeal of the great excise duties, struggled with might and main in support of those duties and their own monopoly, even to supporting the House of Lords in a gross and flagrant violation of almost the only well established rule of that congeries of uncertainties, the British Constitution, viz: the exclusive taxing power of the House of Commons.

It was probably this violation of the Constitution by the

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House of Lords which gave to the earnest advocates of the repeal of the paper duties the leverage they needed to abolish them, and one result of such abolition was immediately seen in the establishment of a cheap newspaper press, many whereof are conducted with an ability exceeding that of the London *Times* (among which the London *Star* is a notable example), while many other dailies far surpass the *Times* in circulation.

Under the new system the influence of the *Times* has sensibly diminished: it is now but one organ of public opinion, and that of the existing governing class only. This result was probably in some measure anticipated by its proprietors: but one other result is the reverse of what they feared. As a commercial speculation it has improved: its profits are greater than ever they were!

Now what was the cause of all this? While an excise duty was imposed upon the manufacture of paper, a jealous surveillance had to be exercised, at an enormous expense both to Government and the manufacturer, to prevent the surreptitious manufacture of paper, the only parallel to which in this country is the surveillance exercised over the manufacture of alcohol. The premises of every paper manufacturer were closely watched, *not* to protect his property from robbery, against which the exciseman afforded no protection, but to see that the manufacturer delivered no paper on which duty had not been paid. The manufacturer could perform some of the nicest and most delicate and elaborate processes of his manufacture only after notice to the exciseman and under his inspection: a time convenient to the manufacturer, sometimes even essential to the success of the process and for that reason appointed by him, being sometimes an impossible one for the government officer!

Invention was at a stand still, for who could afford to experimentalize upon pulp or board on which duty had been paid, or to experimentalize in the presence of the exciseman?

But within a few weeks of the withdrawal of the excise officer on the repeal of the excise duty on paper, the country was alive with inventions of every kind. Paper was manufactured from the refuse matter of other manufactures, of straw, of different fibers heretofore regarded as useless. Articles of utility were manufactured of paper and brought within reach of the multitude, which but lately were the luxury of the rich. Reprints of valuable works at a cheap rate were abundant, and not only the newspaper press—the great instructor of modern civilized communities—but paper and paper manufactures, have made greater progress in England in the very few years which have elapsed since the abolition of the excise laws on paper, and especially since the further amendment of the English custom laws, than in the entire previous period since the invention of paper. L.

[From our Foreign Correspondent.]

BRITISH STEAMSHIPS AND MARINE ENGINES.

Manchester, Feb. 22, 1867.

STAGNATION IN THE MANUFACTURE—BENEFIT OF "STRIKES."

One very important department of engineering I have left unnoticed hitherto, but we shall find it interesting now to take a glance at English steamship and marine engine construction. At present there is a great stagnation in this business, and where a couple of years ago there was an incessant din of riveters' hammers, and the shipyards which line the banks of the Thames and Clyde were crowded with vessels in various stages of construction, now the yards are empty and the noise of hammers has ceased. This is due partly to the terrible financial collapse of last summer—the bursting of the "Limited Liability" bubble, which had given rise to a good many ship building companies with too many of which the main object was to sell their shares and who were therefore obliged to keep busy whether the contracts they could secure would allow a profit or not, and partly also to the folly of the workmen in striking for high wages at a time when the state of business is such that to insist on these is simply to prohibit any work being none at all. The workingmen in many of the trades appear to think the masters can command an unlimited amount of money, and that this is wrongfully withheld from them, and their action is becoming such as seriously to interfere with business and to insure the success of foreign competition. If they could but see it, they are doing their best to deprive themselves of their means of support, which must always be dependent on the ability of the masters to compete successfully for orders with Continental manufacturers. But this is a theme which, though important and well deserving the sober consideration of our own mechanics who are perhaps not always free from the same delusions, is hardly an engineering one, and I will therefore leave it to others to pursue, and offer a few remarks on the work which has been turned out in former years.

WOOD VS. IRON—STRAIGHT OR HOLLOW LINES—STEEL.

It is unnecessary to say that wooden ships are no longer built in England, and yet the fact of this complete change having taken place in so few years is a proof of the rapidity with which new ideas are made to supplant old ones, though we do often complain of the slowness of progress. Wooden ships have one advantage over iron, and that they seem likely to hold for some time yet: namely, their freedom from fouling. There have been any number of inventions which promised to put iron on an equality with copper in this respect, but as yet this result has not been attained.

In regard to the forms of vessels, there has been in most cases a persistent adherence to the old straight lines. Mr. Scott Russell, one of the ablest men of science that the profession can boast, has demonstrated most clearly the advantages of hollow lines, and has determined with complete accuracy the laws which should regulate the length of the curved portion, as well as the other proportions of the vessel for any required speed; but still other forms prevail, at the sacrifice of the speed and the economy of power required to obtain it. There has been but little use made of steel as yet in the construction of vessels, owing in great measure to a degree of uncertainty as to the capabilities of that material to resist the alternate strains of extension and compression to which the sides of a ship are subjected. There is also a doubt how far the greater strength of steel may be taken advantage of to reduce the thickness of the plates without risk of failure from buckling. No doubt, as soon as business revives, experiments will be made to determine all these points, since with the present facilities for the production of steel plates at a low cost it can not be long before steel will be substituted for iron, if not in all parts of the vessel, at least in those for which it is known to be suitable.

FEATHERING PADDLE WHEELS AND WOODEN BEARINGS.

Paddle steamers are in the great majority of cases constructed with feathering wheels, the arms and floats being of wrought iron and the journals cased with brass and working in lignum vitæ bearings. The saving of power by the use of these is considerable, and that they have not come into use more generally with us must be attributed to the difficulties arising from the great quantities of ice in nearly all our harbors in winter, to encounter which requires the most substantial form of wheel possible. And again, with the very large wheels and light draft of our river boats the angle of the entering bucket is not sufficient to cause serious loss of power.

SCREWS.

The advantages of screw vessels over paddles have been most strikingly shown since the vessels of the French Compagnie Generale Trans-Atlantique commenced running. The consumption of coal per horse-power is not found to differ greatly in the two cases, but the amount of horse-power or of coal required is so much in favor of the screw that some of their paddle steamers are to be altered to receive that form of propeller. The Cunard line have also, as we know, abandoned the construction of paddle steamers, while the same may be said of the other large companies, such as the Inman, Peninsular and Oriental, etc.

ENGINES—DOUBLE HIGH AND LOW CYLINDERS—ECONOMY OF EXPANSION.

It is the engines, however, with which English ships are furnished that contribute most to their success in an economical point of view. England is fortunate in that she has no Isherwood and no Dickerson, and accordingly the greatest advantage is taken of expansion in engines of substantial mechanical construction. Messrs. Randolph & Elder, of Glasgow, have given their preference to the high and low pressure cylinder form of engine to obtain high degrees of expansion, and the performance of one of their engines was lately proved by a race, not at the dock, but for the distance of over a thousand miles on a regular voyage, and the consumption of coal was shown to be not over 2½ lbs. per horse-power per hour.

There was a class of engines built about three years ago by Messrs. Humphreys & Tinnant for the Peninsular and Oriental steamers, also of the double cylinder type, which, though not proving mechanically satisfactory, were acknowledged to be most economical in their consumption of coal. They were of the vertical overhead cylinder type, and the high pressure cylinder was placed directly on the top of the low pressure one, the two pistons being fastened to one rod. The diameter of the former was 43 inches and of the latter 96 inches, the stroke being three feet, so that the expansion was fivefold. The steam was carried at about 28 lbs., and the engines ran at from 75 to 80 revolutions per minute, or at a speed of piston of 450 to 480 feet. Both cylinders were jacketed and the steam introduced first into the jacket of the high pressure cylinder at a temperature of 360°, or about 86° above its temperature as saturated steam. On leaving the jacket its temperature was about 307°, or 33° superheated, at which temperature it entered the high pressure cylinder. The steam was discharged from the low pressure cylinder into a surface condenser and a vacuum of 27½ inches obtained. To supply steam for these engines four boilers were employed, with three furnaces in each, the total grate suface being but 180 square feet and the heating surface 4,800 square feet, and these boilers working with natural draft were able to supply an abundance of steam for the pair of engines driving a screw of 16 feet 6 inches diameter and 19 feet pitch at the above-mentioned speed, the horse-power developed being 2,486. These results I have given somewhat in detail, because they show what can be done by a combination of good elements in a steam engine. I can vouch for the accuracy of the figures, as they are the results of my own observations on the occasion of the trial trip of the Peninsular and Oriental Company's steamer *Baroda* in Stokes Bay, at which I had the pleasure of being present. The *Meooltan*, another vessel and the first, I believe, of this class, had under favorable circumstances developed a horse-power with a consumption of but 1¾ lbs. of coal. Notwithstanding economy, however, these engines have fallen into disrepute on account of their great weight and costliness, together with the liability to accidents from the quick motion of such heavy reciprocating parts. With these results within their knowledge, it would be difficult to convince the engineers of the Peninsular and Oriental Company that no economy resulted from a greater degree of expansion than follows from cutting off the steam at seven tenths the stroke. Nor does it follow because these particular engines were not mechanically successful that expansive working must be abandoned: for other forms of engine by the same and other makers are doing nearly as well in regard to economy of coal and give no trouble in their operation. The *Lord Clyde*, an iron-clad 280 feet long and 58 feet 11 inches beam, was tried about a fortnight since at the measured mile in Stokes Bay, drawing 23 feet forward and 27 feet aft. She has a pair of engines with 116-inch cylinders, 4 feet stroke, and these worked at 65 revolutions per minute, developing 6,045 horse-power and driving the vessel at 13·342 knots on a mean of six runs. To supply steam for these engines there are nine boilers with a total heating surface of 19,000 square feet and 700 square feet of grate surface. This does not put our new sloops of the *Hassalo* class, with their 1,064 square feet of grate in the main boilers besides 76 square feet additional in the superheating boilers, in a very favorable light. If we allow 20 lbs. of coal as the rate of combustion per hour per square foot of grate in the case of the *Lord Clyde*, which is a large amount, we have a horse power produced for an hour at the expense of 2⅛ lbs. of coal. With the amount of heating surface given it is not probable that the combustion would be forced beyond this rate.

HYDRO-PROPULSION.

There have been some interesting trials of late with Mr. Ruthven's water, jet propeller as applied to the gunboat *Waterwitch*. The accounts of the performance of this vessel in October last gave rise to a good deal of discussion in the leading engineering papers as to the value of this means of propulsion as shown by the trial and as indicated by theory, and the general conclusion arrived at by those who took part in it was that it was very wasteful of power. Since then further experiments have been made and slightly better results obtained, and as the theoretical principles involved do not seem to be altogether clear in the minds of all, engineers are disposed to suspend judgment till further trials have been made. The nozzles which on the former trip were placed so as to discharge the water into the air above the level of the external water, have now been arranged so as to deliver below the water line, thus avoiding the loss of power in lifting the water through a vertical distance, and no doubt checking somewhat the velocity of escape of the water. The idea of this propeller is not new, but Mr. Ruthven has given a good deal of study to perfecting it. It of course gives considerable facilities for maneuvering in the case of a vessel of war, but it also involves carrying a large weight of water in the ship, thereby increasing its displacement. For merchant vessels it could not compete with the screw.

These few remarks, indicating in a general way what has been aimed at and accomplished in marine engineering, will serve as an introduction to more detailed descriptions of engines which I hope to send you from the Exhibition.

Slade.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING MARCH 12, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the Scientific American, New York.

62,724.—Dusting Brush.—Robert H. Aldrich, Northampton, Mass.

I claim the duster herein described, constructed of plumes formed by attaching strips of sheepskin to wires, a a, etc., which are fastened in the handle, A B, in the manner set forth,

62,725.—Porcelain Gas Burner.—T. G. Arnold and Benj. Irving, New York City.

We claim the making of a glazed porcelain gas burner by perforating or slitting it after being glazed, for the purposes and in the manner substantially as hereinbefore set forth.

62,726.—Heating Stove.—Wm. Bamford, Milwaukee, Wis. Antedated Sept. 12, 1866.

First, I claim the air heating chamber composed of an upper and lower cylinder connected by one or more air flues, and located entirely above the fire box, so as to bring all parts of the chamber and flues in contact with the heated products of combustion, substantially as set forth.

Second, The combination and arrangement of the upper cylinder, C, and lower cylinder, B, connected by the flues, c, and located above the fire box, with the pipe or flue, F, and the discharge pipe, I or E, and stove case, A, substantially as specified.

62,727.—Car Truck.—Levi Bissell, New York City.

I claim a two-wheeled truck in combination with a truck of four or more wheels, both trucks moving on king bolts and connected together by jointed braces, substantially as set forth.

62,728.—Flower Pot and Tub.—Jesse Booher, Dayton, Ohio.

I claim the cast iron plate, A and B, and their arrangement with reference to the staves, e, and rods, f f, in the manner substantially as and for the purpose described.

62,729.—Lifting Handle.—Purmort Bradford (assignor to Sargent & Co.), New Haven, Conn.

I claim the socket, A, formed with a vertical slot, d, provided midway with a seat to receive the trunnion, a, constructed and arranged to operate as herein described, as an article of manufacture.

62.730.—Potato Scoop.—E. Brown and Wm. Pool, Birmingham, Mich.

We claim as an article of manufacture a potato shovel, A A' B, constructed substantially as described.

62,731.—Artificial Leg.—Enoch Carleton and Eli Goss, Portland, Me.

We claim a knee joint made stiff, when the weight is borne upon the leg, by means of a movable rod or bolt attached to the leg, externally or internally bearing upon the heel and extending upward into a catch or slot upon the leg above the knee joint, which rod is worked by means of a spiral or other spring, in such a manner that when the weight is removed from the leg the rod is forced downward by the spring out of the slot or catch, thus liberating the joint and leaving the lower leg free and swinging, and when the weight is placed upon the leg by bearing upon the heel, the rod is pushed upward into the slot or catch, and the knee joint thus held stiff while the weight is borne upon the leg.

We also claim the rendering of the knee joint stiff or limber at pleasure by means of a spring rod and catch applied as above described,

62,732.—Fence.—Geo. R. Clark, Livonia, N. Y.

I claim the relative arrangement of the joint braces or jacks, J, and the seq

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tions or lengths, B and A, when the parts are constructed and connected substantially in the manner and for the purposes herein set forth.

62,733.—BRAN DUSTER.—Isaac Cook (assignor to himself and M. Randolph & Co.), St. Louis, Mo.

First, I claim feeding the material through a pipe, L, and upon the receiving head, underneath the beaters, substantially as set forth.

Second, Passing the material upwardly from the head, I, by an upward air draft drawn from the lower air feed, K, substantially as set forth.

Third, The receiving head, I, constructed and operating substantially as and for the purposes set forth.

Fourth, Adjusting the beater, n, to any desirable angle, by means substantially as described.

Fifth, The combination of the beaters, n, and the distributing head, N, operating substantially as set forth.

Sixth, Returning the bran from the receiving surface, f', through the feed pipe, L, substantially as and for the purposes described.

Seventh, The combination of the feed pipe, L, head, I, distributing head, N, and adjustable beaters, M, substantially as and for the purposes described.

62,734.—BASIN.—Hugh H. Craigie, New York City.

I claim a stationary wash basin with a horizontal flattened water way around the upper portion of said basin and outside of the general curvature of the interior of the basin, said waterway opening into the basin through the sides thereof, so as to take away the surplus or overflow water from the basin as specified.

I also claim forming the descending horn or overflow pipe upon the outside of said horizontal waterway and opening into the same, as specified.

62,735.—GATE.—Geo. G. Curtiss, Rochester, N. Y.

First, I claim in combination with a sliding gate, A, the employment of the double inclined rails, B B', the one running the length of the gate and the other extending beyond and serving to hold the gate in place while at the same time it insures its self action, the whole arranged and operating as and for the purposes herein set forth.

Second, The combination of the brace, d, with the extended inclined rail, B', and gate, A, as and for the purpose specified.

Third, The combination and arrangement of the clip or stirrup, D, holding the roller, a, operating as herein set forth.

Fourth, The combination of the sliding guide, i, with gate, A, and inclines, B B', as set forth.

Fifth, The double-acting latch, C, employed in combination with the gate, A, as specified.

62,736.—CANAL AND NAVIGATION THEREOF.—Horace H. Day, New York City.

First, I claim in the construction of canals the double inclined planes in combination with floating dry docks or movable camels, and their combination with canals for the raising and transportation of vessels from one water level to another, substantially as described.

Second, The ratchet shafts or their equivalent for holding or moving the wire or other cable, when used in combination with inclined planes and movable locks, substantially as described.

Third, The water tanks, caissons or locks constructed with a wedge-shaped bottom, to hold water upon a level, for passing ships up and down inclined planes, substantially as described.

Fourth, The water tanks, caissons or locks containing water for passing vessels up and down inclined planes, in combination with stationary rollers or wheels placed in and revolving upon the bed of the inclined plane, substantially as described.

Fifth, The wedge-shaped camels, or a detached segment or portion thereof, or both, upon inclined planes for passing the same from one angle or inclination to another, and the combination of the wedge-shaped camels with one or more inclined planes when used to transport vessels, substantially as described.

62,737.—PRUNING SHEARS.—A. J. Doolittle, Hamden, Conn.

First, I claim the arrangement of the double-leg coil spring in the manner described, in combination with the two handles, B and D, substantially as and for the purpose specified.

Second, The combination of the loop, I, upon the one handle, and the hook, L, upon the other, so as to operate substantially as set forth.

62,738.—VACUUM PUMP.—Edward Dunscomb, Boston, Mass. Antedated Feb. 28, 1867.

I claim the peculiar construction of the vacuum pump, j j, that is so composed of the vessels, n and o, and pipes, h i K, with their stop cocks, as to operate both as a vacuum pump and vapor receiver and storer, substantially as and in manner described.

62,739.—VACUUM PUMP, PAN, ETC.—Edward Dunscomb, Boston, Mass. Antedated Feb. 28, 1867.

First, I claim the air induction pipe, c', with its stop cock, d', applied to the air-tight tank, g', for the purpose described, substantially as set forth.

Second, I also claim the pipe, f, with the stop cock, f', as applied to tank, g, and trough, e, as before described.

Third, I also claim the employment of the generator, C, in combination with the condenser, D, and pipes h and k, and vacuum pump, j j, substantially as set forth.

Fourth, I also claim in combination with the condensing apparatus before described, the air-tight tank, g, in the manner and for the purpose set forth.

Fifth, I also claim the combination of the condensing dome, d, and trough, e, with pipes, h i k and vacuum pumps, j j, essentially as set forth and explained.

62,740.—CHURN.—John E. Finley, Memphis, Tenn.

I claim the combination of the propeller wheels, B C, with the air cells or indented arms, D D, for the purpose herein set forth.

62,74[illegible]—BAG HOLDER.—L. H. Gano, Milwaukee, Wis.

First, I claim a platform, A, upright standard, B, and adjustable arm, C, in combination to fold up, substantially as and for the purpose described.

Second, Arm, C, with jaws, D, metal jaws, E, support, F, and spring, G, in combination, substantially as and for the purpose described.

62,742.—DUSTING BRUSH.—Aaron S. Hadley, Boston, Mass.

I claim the combination as well as the arrangement of the spreader with the handle, the flexile arms, and masses of fibrous material applied to and arranged with such arms or to them and the handle, substantially as specified.

I also claim the combination of the finishing masses of fibrous material, extending through the handle with the flexile arms or the same and the spreader, and the masses of yarns or fibrous material rranged within such arms, as explained.

62,743.—TRUSS.—Josiah Harrison, Frederick, Md.

I claim the arrangement on the flexible belt, A, of the pad or pads, B, adjusted by means of slides, D, bolt, E, and nut, E', substantially as described and represented.

62,744.—TRUCK.—John P. Hart, Chicago, Ill.

I claim the use of different sized car wheels of trucks upon the same axles, as and for the purpose set forth, to obviate the necessity of transferring passengers or freight on account of the difference in the gages of railroads.

62,745.—RAILROAD FROG.—John P. Hart, Chicago, Ill.

I claim the grooves, G, for allowing compound wheels to pass through the frog, substantially as set forth.

62,746.—PREVENTING THE LAPPING OF BELTS ON SHAFTING.—Wm. Hayes, Fall River, Mass.

I claim the device herein described for preventing belts from lapping around shafts, constructed, applied and operating as herein set forth.

62,747.—SPRING HINGE.—Franck Herrmann, Newport, Ky.

I claim, First, The stationary pintle, D', havin the notched collar, E e, and stop, J, in combination with the helical springs, H H', cheeks, I I, and slotted eye, G, constructed and arranged substantially as herein set forth.

Second, The square eye or socket, C, in combination with the toe, d, on the pintle, D', and collar, E e, for the purpose herein set forth.

62,748.—BENCH DOGS.—A. K. and H. P. Hood, Lowell, Mass.

We claim the cam spindle, c, and block, h, when operating substantially as described and for the purpose fully set forth.

62,749.—ORE CONCENTRATOR.—Morgan Hungerford, San Francisco, Cal.

I claim, First, A pan ut in two and dropped about one inch, so that the lowest depression shall be two inches, more or less, below the ridge or angle of such concentrator, substantially as described and for the purpose set forth.

Second, The slots or outlets, F F, above the line of the groove around the inner rim, as described.

Third, The outer rim, G, with stops, H H, also the discharge holes, J J, under the pan, around the said outer rim, substantially as described and for the purpose set forth.

62,750.—CONSTRUCTION OF STILLS FOR OIL, ETC.—John Huntington, Cleveland, Ohio.

I claim the flues, E J, and damper, M, or their equivalents, arranged in relation to an annular flue. K, surrounding the base of the still, and operating conjointly in such a manner as to be combined with a single or double furnace to diffuse a uniform heat without injury to the oil or burning of the still, and also to induce a current of cold air to reduce the heated oil and still as specified.

62,751.—BOXES FOR TRANSPORTING PLANTS.—Joshua Jenkins (assignor to himself and Samuel Williams), Salem, Ohio.

I claim a transplanting box, constructed and arranged substantially as and for the purpose specified.

62,752.—PEAT MACHINE.—Samuel P. Jenks (assignor to Edward A. Gallraith), Boston, Mass.

I claim, First, The combination of pockets or boxes, plungers and movable bottoms passing to the top of the pockets for the compression of peat and other substances, substantially as described.

Second, The arrangement of curved inclined planes, discharging shafts and ears, to bring the compressed cake of peat to the surface, substantially as described.

Third, The arrangement of the wiping belts and mops pressing by the sides of and in combination with the perforated boxes, and the squeezing or drying rollers to dry the mops, substantially as described.

Fourth, The general combination and arrangement of the whole machine, constructed as and for the purpose substantially as described.

62,753.—DOOR LOCK.—David C. Jordan, Sen., Brooklyn, N. Y.

I claim the combination of the bolts, revolving disk, and catch lever, substantially as described, operating as herein specified for the purpose set forth.

62,754.—AUGER.—T. C. Keith (assignor to Joseph K. Mallery), Valley Falls, R. I.

I claim the use, application, or employment of a clearing disk, C, substantially as described, in combination with an auger or center bit as described for the purpose specified.

62,755.—OAR.—B. J. Kellam, Tremont, N. Y. Antedated February 15, 1867.

I claim the construction of a balancing oar in the manner shown and described.

62,756.—MEASURING ROD.—A. D. King, Granville Corners, Mass.

I claim an extension rod, consisting of the frame formed of the parallel pieces, A and C, connected substantially as shown, and the extension piece, B, sliding in the same, the whole combined and arranged as herein set forth.

62,757.—CISTERN FILTER.—George W. Lampson, Waterloo, N. Y.

I claim the pans, B C D and E, and cone, F, in combination with the vessel, A, the whole constructed and arranged substantially as and for the purpose described.

62,758.—MANUFACTURE OF BARS OR RODS OF IRON OR STEEL.—Bernard Lauth (assignor to himself and James McCarty), Reading, Pa. Antedated Sept. 2, 1866.

I claim bars of metallic iron or steel treated substantially in the manner and for the purpose described.

62,759.—OINTMENT FOR CURING SPAVIN, SPLINT, ETC., IN HORSES.—Benedict Lehmann, Piqua, Ohio.

I claim the combination of the above-named ingredients, so as to procure an ointment for the purpose of curing the blemishes above mentioned.

62,760.—PREPARING FERTILIZER.—George A. Leinau, Philadelphia, Pa.

I claim the fertilizer made by the process set forth, in which vegetable matter is banked up with quick lime, and mixed with certain other-named ingredients at proper intervals of time, in the manner substantially as described.

62,761.—ANIMAL TETHER.—Isaiah Lincoln and Aaron Pratt, Cohasset, Mass.

We claim the device for tethering animals substantially as described.

62,762.—MEASURE FOR LIQUIDS.—Samuel Mainster and John F. Kirkwood, Thistle, Md.

First, We claim the arrangement of the gates, C D, in relation to each other and to the measuring vessel, A, as constructed substantially as and for the purposes specified.

Second, The arrangement and combination of the measuring vessel, A, its supporting frame, B, valves or gates, C D L, and the standards, N, substantially as and for the purpose set forth.

62,763.—DUST ARRESTER FOR RAKING STOVES, FURNACES, ETC.—John Martino, Philadelphia, Pa.

First, I claim the combination of the horizontal slot, a, and door, H, or its equivalent, with the fire door, or other vertical plate of a stove range or heater, substantially in the manner described and for the purpose specified.

Second, The combination and arrangement of the pendent valves, b and b', with the slot, a, substantially upon the principle and in the manner above described and for the purpose set forth.

62,764.—BRICK MACHINE.—Peter Marvin, Warsaw, Ind.

First, I claim the combination of the mixers, F, pickers, E, and molds, m, substantially as set forth.

Second, The cams, X Y Z, &, in combination with dies, n, molds, m, guides, P, and rim, D, substantially as and for the purpose set forth and described.

62,765.—WINDOW BLIND.—Charles G. Matchett, Greenville, Ohio.

I claim a flexible curtain, B, provided with bands or cords E E' F I, arranged substantially as set forth, to admit of rolling the curtain from the upper or lower end at will.

62,766.—PLOW.—Don Carlos Matteson and Truman P. Williamson, Stockton, Cal.

First, We claim the curved standards, A, with the lug, B, and the offsets, D and E, substantially as and for the purpose described.

Second, The curved mold board, F, with its two complete edges, H and H', attached to the standards as shown, and operated substantially as and for the purpose herein described.

62,767.—MACHINE FOR MOLDING THE BACKS OF BOOKS.—J. Kennedy Max, Springfield, Mass.

First. I claim the adjustable cylinder, D, constructed substantially as and for the purpose specified.

Second, The use of steam or the heated rods, x, for the purpose of heating the same, substantially as described.

Third, The adjustable bed, E, operating substantially as described.

Fourth, The combination of the cylinder, D, bed, E, slides, B B, and treddle, I, having the rods, F F, and springs, K K, with the table, A, operating substantially as and for the purpose set forth.

62,768.—BROOM HEAD.—H. B. Miller and M. P. Weston, Grand Rapids, Mich.

I clnim the combination with the flaring case, C, of the bars. D D, with the teeth. d, projecting through the sides of the case into the broom corn, and connected by set screws, E E, substantially as described.

62,769.—HARROW.—D. C. Myers, South Bend, Ind.

I claim the arrangement of the series of angular jointed harrows, A B C, with their respective braces and connections, when constructed and combined as and for the purpose set forth.

62,770.—MANUFACTURE OF ARTIFICIAL STONE.—John Nagele, Duncansville, Pa.

I claim the composition of the ingredients when used in the quantities as herein described, and placed under water under a heavy pressure, for the purpose of producing a cheap and durable artificial stone.

62,771.—SLEIGH.—S. Henry Noble, Chicago, Ill.

First, I claim the rubber spring, I, or its equivalent, placed in the joint between the knee and the cross beam of a sleigh, substantially as and for the purpose set forth.

Second, The combination of the support, H, with the runner, A, knee, B, roller, I, and beam, C, substantially as described.

62,772.—CAR COUPLING.—J. H. Parsons, Quincy, Mich. Antedated March 1, 1867.

I claim the use of a spiral spring, y, and the slide-hook pin, S, or its equivalent, substantially as described.

62,773.—IRON MACHINE.—George B. Perkins, Bridgeport, Conn.

First, I claim the arrangement of the hollow revolving or rotating heated iron, M, in relation to the mechanism described, to permit the movement of the said iron over the surface to be ironed or polished, substantially as herein set forth.

Second, In combination with the foregoing, I claim the table, B, constructed and arranged so as to draw the front smoothly thereon, substantially as herein described.

62,774.—BOOK HOLDER.—Theron E. Platt, New Haven, Conn.

I claim the combination of the rack, J, the rod, F, with their socket, H, and with the socket, B, made adjustable upon a plate, A, the whole constructed and arranged substantially as described.

62,775.—MEASURING THE STRENGTH OF WATCH SPRINGS.—M. A. Plympton, Northborough, Mass. Antedated Feb. 25, 1867.

I claim the index lever, b, in combination with the chamber, A, slot, a, and pin, f, constructed and operating substantially as and for the purpose described.

62,776.—MODE OF COLLECTING GOLD AND SILVER FROM SWEEPINGS, WASHINGS, ETC.—J. H. Rae, M. D., Syracuse, N. Y.

First, I claim the within-described process of treating sweepings, filings, or washings containing gold or silver, by exposing the same to the combined action of a current of electricity and of suitable solvents or chemicals, substantially such as herein specified, or any others which will produce the same effect.

Second, Separating gold and silver from washings, filings, or sweepings containing said metals, by the action or aid of electricity, substantially as described.

Third, Using the bath, A, as an electrode and as an agitator, substantially as and for the purpose set forth.

62,777.—COTTON-BALE TIE.—Gustavus Ricker, Covington, Ky.

I claim the plate with slot, B, having angular projections, C, one above and the other below the plate on opposite sides of the same slot, substantially as represented and described.

62,778.—TRAVELING BAG.—E. A. G. Roulstone, Roxbury, Mass.

I claim connecting the bag leather or body to the frame, by first securing the edge of the flexible material in the fold of a strip, d, and then applying said strip to the frame between the groove, b, and plate, f, uniting the whole together substantially as set forth.

Also reinforcing the corner of the frame, by turning down the tail pieces, i, so as to form a backing for the plate, f, at the corner, substantially as described.

Also forming the angle, k, rounding or concentric to the corner, when constructed and arranged as set forth.

62,779.—TRAVELING BAG.—E. A. G. Roulstone, Roxbury, Mass.

I claim the attachment of the flexible body of a bag to the frame thereof, by inserting the edge between two lips, b d, one or both of which are formed on a strip or plate, c, riveted to the frame by rivets passing through the edge of the flexible body, the frame and the strip or plate substantially as set forth.

Also, by forming the corner, e, by producing folds, f, and flatly compressing the same, substantially as shown and described.

62,780.—CATTLE TIE.—S. C. Rundlett (assignor to himself and Joseph Grant), Portland, Maine.

First, I claim the center screw, g, to unite the two discs when placed within the rim.

Second, In combination with the two discs, a and b, when the disc, b, has the washer, c, the shoulder, m, on the inside of the rim.

Third, attaching the rope at the rim, as set forth, in combination with the center screw, g, shoulder, m, and washer, c, on the disc, b, for the purpose of allowing the two united discs to revolve within the rim.

62,781.—BRICK MACHINE.—James Sangster, Buffalo, N. Y.

First, I claim the combination and arrangement of the arms, H I, and J, and the piston, G, when constructed substantially as described.

Second, The grooved rollers, when used in combination with plain or straight rollers, as and for the purposes described.

Third, The construction of the lower part of the mold, by means of which the piston, K, as it descends, leaves the necessary ventilation as described.

Fourth, The segment, T', when constructed substantially as and for the purposes described and set forth.

Fifth, I claim the arms, A A, and crank wheels, T and T,' when used to give the reciprocating motion to the pressing piston of a brick machine, substantially as described.

62,782.—BRICK MACHINE.—J. Nottingham Smith, Jersey City, N. J.

First, I claim the revolving annular wedge, D, applied to a brick press, and constructed and operating substantially as an for the purpose herein specified.

Second, I also claim the mold carrier, H, in combination with the annular wedge, D, substantially as herein set forth.

Third, I also claim the plunger, I, in combination with the annular wedge, D, substantially as herein described.

Fourth, I also claim the combination and arrangement of the mold carrier, H, plunger, I, and annular wedge, D, substantially as herein specified.

Fifth, I also claim the combination of the suspended bed, C, in combination with the mold carrier, H, plunger, I, and annular wedge, D, substantially as herein set forth.

Sixth, I also claim the mold with chilled cast iron plates, r r, applied substantially as herein described.

62,783.—BOOT HEEL.—Heman S. Snow, West Meriden, Conn.

I claim the combination of the heel. C, with its notches, a, more or less, and the heel plate, B, with its projection, d, when constructed and arranged so as to be adjustable to different points, and secured at such point by a spring arranged substantially in the manner herein set forth.

62,784.—SECURING BUTTONS TO GARMENTS.—Chas. F. Spencer, Rochester, N. Y.

I claim the disc, f, constructed substantially as described, in combination with the stem or shank, c, of a button provided with a head, i, arranged and operating substantially as and for the purpose set forth.

62,785.—CHURN.—W. H. Tambling, Mazo Manie, Wis.

I claim the arrangement of the boxes, A and C, the one provided with the arms, E E, and paddles, a a, and the other divided with gauze wire rings and bottom, the two being constructed and used as and for the purpose specified.

62,786.—CHURN.—William B. Tucker, Hillsborough, Ohio.

I claim combining the angular dasher blades, in alternating positions, upon the dasher arms of said churn, substantially in the manner and for the purpose herein set forth.

62,787.—ASH PAN AND FIRE GRATE FOR LOCOMOTIVES.—D. Upton, and C. H. Nichols, Rochester, N. Y.

First, We claim the application of the draft or flue plates, D, substantially in the manner and for the purposes herein shown and described.

Second, In combination with the said draft plates, D, the contracting plates, P, and grates, B, substantially as and for the purposes set forth.

62,788.—HOISTING MACHINE.—Samuel Van Emon, Cincinnati, Ohio.

First, I claim an elevator platform, provided with a spiral drum or worm, D, in combination with two or more vertical flights of rollers, i, arranged and operating as set forth.

Second, The provision of the anti-friction roller frame, E F G H, for the purpose specified.

Third, The gravitating pulley frame, P, and brake, operated in the manner and for the purpose specified.

62,789.—WAGON BRAKE.—Aaron Votaw, New Garden, Ohio.

First, I claim the bar, B, cam, E, as arranged, in combination with the links, F H I, levers, G, and adjustable frame, K, as and for the purpose set forth.

Second, The bar, B, cam, E, as arranged in relation to the wheels, A, and operated by the frame, K, levers, G, and links, F H, and I, for the purpose and in the manner described.

62,790.—BRICK MACHINE.—John Watson, Buffalo, N. Y.

I claim the stationary pins, F and G, or the equivalent thereof, when placed within the faces of the pressing pistons, and so arranged as to be dependent upon the motion of said pistons for their effect.

62,791.—LOOM.—John R. Weber, Bourbon, Ind.

I claim the combination of the lever, 16, cams, 17 and 18, with the hook, 19, pinion, 34, bar, 24, spring, 23, lever, 26, cams, 20 and 21, when constructed to operate the shuttle plate, 37, substantially as set forth.

62,792.—CLAMP FOR CLAPBOARDING.—William P. Wentworth, Detroit, Mich.

I claim, as a new article of manufacture, a clapboarding implement, arranged and operating as set forth.

62,793.—FORGING HAMMER.—Lorin Wetherell, Boston, Mass., assignor to himself and John H. Wells.

First, I claim the first pair of dies represented in Figs. 1 and 2, constructed and operating as described.

Second, The fourth pair of dies, represented in Figs. 11, 12 and 13, constructed and operating as described.

Third, The fifth pair of dies, represented in Figs., 15 and 16, constructed and operating as described.

Fourth, The process of forging hammers, by the use of a series of dies constructed and operating substantially in the manner specified.

62,794.—DENTIST'S CHAIR.—Otis C. White, Hopkinton, Mass.

I claim the combination as well as the arrangement of the bail, D, the clamp, C, and the pivoted rod, B.

I also claim the combination as well as the arrangement of the bail, D, the clamp, C, the slide rod, E, and the pivoted rod, B.

I also claim the combination of the bail and socket clamp, n, and the arm, o, with either or both the rods, B E, the clamp, C, and the bail, D, the whole being applied to the head rest and back of a chair, or their equivalents, substantially in manner and so as to operate hereinbefore set forth.

I also claim the clamp, C, constructed with the two openings, f g, the rear saddle, k, and the set screw, h, arranged in it substantially as specified.

62,795.—PUDDLING IRON.—Jacob G. Willans, Bayswater, England.

I claim the lining of that part of revolving or reciprocating puddling furnaces, which is exposed to friction of the iron in the charge whilst working with blocks or forms cut or shaped from the minerals above described.

62,796.—WAGON BRAKE.—James F. Wood, 2d, Cohocton, N. Y. Antedated March 1, 1867.

First, I claim the adjustable cam, E, on the lever, D, the plate, h, on the brake lever, as and for the purpose herein described.

Second, I claim the sliding plate, B, hasp, k, in combination with the sliding pole, A, fork braces, a a, and the brake blocks, i i, substantially in the manner herein described, and for the purposes set forth.

62,797.—CUT OFF VALVE GEAR OF STEAM ENGINE.—Walter Wright, Danvers Center, Mass.

I claim the construction of each of the trapezoidal projections, I I, with offsets or steps as set forth, to operate in combination with the arms, l m, and the two shafts, n o, arranged and connected in manner and to operate as described.

I also claim the combination and arrangement of the shafts, n o, the arms l, m and r, when arranged in manner and to operate with the trapezoidal projections, I I, fixed to the auxiliary valves, G H, applied to the main slide valve, F, as described.

62,798.—PREPARING PETROLEUM FOR LUBRICATING.—W. H. Young, Athens, Ohio.

I claim the cleansing of oil by means of an underlying body of heated water, substantially as described.

62,799.—TOBACCO CUTTER.—Charles J. Addy, Roxbury, Mass.

I claim the combination of the adjusting arms, E E, and setting pin, t, and holes, s s, or the equivalent thereof, with the presser, D, combined with a knife, a, and feeder, C, arranged to operate substantially as specified.

I also claim the above described arrangement of the rack, k, the pinion, i, ratchet, h, and draw pawl, g, with the presser, D, the feeder, C, the knife, a, or knife lever, B, and its shaft, d.

And in combination with the knife lever, B, shaft, d, arm, f, draw pawl, g, ratchet, h, the pinion, i, rack, k, and the feeder, C, I claim the mechanism for varying the feed as described, such mechanism consisting of the bent prongs, g g, of the draw pawl, with the pin, p, and the holes, y y, arranged in the prongs, and the said arm f as specified.

62,800.—SMOOTHING IRON STAND.—Charlotte W. Allen, Newport, Ky. Antedated Feb. 28, 1867.

I claim the smoothing iron stand, consisting of the guard or rim, A B, and the screw clamp, C D, combined and arranged substantially as and for the purpose specified.

62,801.—HANDLE FOR BRUSH.—Clark Alvord, Westford, Wis.

I claim the application to and combination of an elastic strap, with a brush, as above described and shown, and for the purpose above set forth.

62,802.—TOBACCO PIPE.—Solomon Andrews, Perth Amboy, N. J., assignor to Emmett Dinsmore, Erie, Pa., and Charles M. Plumb, New York City.

I claim the elongated pipe, A, with its opening, H, at its upper side, at the end, B, when its stem is constructed and applied in the manner herein represented and described.

62,803.—CAR COUPLING.—Richard S. Arnall, Wright City, Mo.

I claim the arrangement of the rod, D, with its arm and pin, C, and elon-

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gated box, E, when used in combination with lever, F, rod, H, shoulder, x, spring, I, and box, H, the several parts being constructed and used as and for the purpose specified.

62,804.—CHURN.—S. S. Ayers, Plainfield, N. J.

I claim the combination and arrangement of the dasher, O, churn lid or cover, P, dasher handle, L, guide rod, K, pitman, J, crank, I, fly wheel, H, pulleys and band, E D F, or equivalent, and crank, C, with each other, substantially as herein shown and described, and for the purpose set forth.

62,805.—WRINGING MACHINE.—Selden A. Bailey (assignor to Bailey Washing and Wringing Machine Company), Woonsocket, R. I.

First, I claim the manner of assisting the increased rapidity of the driven roll, D', and easing the movement of the machine as set forth, by making the diameter of the driving pinion, E, greater than that of the driven pinion, F, both pinions having the same number of teeth substantially as described.

Second, The combination of the flanges, a, on the pinions, E or F, or on both of them, with the shafts of the opposite rolls, as and for the purpose set forth.

Third, The combination substantially as described, of the flanges, a, and hubs, b, with the pinions, E and F, for the purpose set forth.

Fourth, The springs, G G', and set screw, d, or other equivalents, with the journal blocks, H, operating substantially as set forth, in combination with the pinions, E and F, arranged and operating substantially in the manner and for the purpose described.

62,806.—CLIMBING STAGE.—Loring J. Baker, East Machias, Me. Antedated March 1, 1867.

I claim the general construction and combination of the parts of a climbing machine, substantially as described and for the purpose set forth.

62,807.—COAL SCUTTLE.—A. Bardell and Smith, New York City.

First, we claim the combination of a body and base rim, with a bottom so constructed as to have a flange, which can be sprung into the recess formed upon the body, and thereby bring together three thicknesses of sheet metal, just above the bottom of the coal scuttle, substantially as and for the purpose herein described.

Second, A struck up and corrugated sheet-iron bottom B, in combination with the body and base rim, substantially as and for the purpose herein described.

62,808.—CULTIVATOR.—A. S. Barnwell, Savannah, Ga.

I claim the two adjustable shares, G G, in combination with the fixed double share, D, applied to the beam, A, and arranged to operate in the manner substantially as and for the purpose set forth.

62,809.—TRAP DOOR.—Samuel R. Bartlett, Detroit, Mich.

I claim the combination and arrangement of the arm, C, the rod, a, and the stop, b, when attached to a trap door, substantially as herein shown and described.

62,810.—COMPOSITION FOR ROOFING.—Alonzo T. Boon (assignor to himself and Joseph Stafford), Galesburg, Ill.

I claim the composition for roofing compounded from the ingredients specified, substantially as herein set forth.

62,811.—MACHINE FOR GRANULATING TOBACCO.—Nicholas H. Borgfeldt, New York City.

I claim, First, An apparatus for granulating tobacco composed of a closed box, A, movable toothed sieve, D, and yielding head, E, with projections, d, constructed and operating substantially as and for the purpose described.

Second, The arrangement of a sieve, D, with teeth, b, constructed and operating substantially as and for the purpose set forth.

Third, Making the sieve, D, shaft, C, and head, E, removable from the box, A, as and for the purpose described.

62,812.—OVER-FLOW BASIN.—Harkness Boyd, New York City.

I claim a stationary basin or vessel having an ordinary waste or discharge plug in combination with an over-flow pipe opening into said vessel near the bottom thereof and ascending as a siphon to the desired water level up such basin, as and for the purposes described.

62,813.—SAW.—Ira S. and Charles N. Brown, Providence, R. I., assignors to themselves and Mason Gross.

We claim the combination of the curved shank, b, with projections, b' b'', and means for locking or fastening the last tooth in the series, the whole operating together substantially in the manner and for the purpose above set forth.

62,814.—WHIFFLETREE.—Melvin C. Chamberlin, Plainview, Minn.

I claim the arrangement of the bars, C C D and E, constructed as described and used in connection with the lever, F, and box, a, substantially as and for the purpose herein specified.

62,815.—BALING PRESS.—Moses D. Cheek, Clarendon, Ark.

I claim the nut wheel, F, constructed with the hub, C, and the bored recess J, substantially as and for the purpose set forth.

The nut wheels, F, pinion, L, provided with the two bevel gears, M and N, and dividing pinions, P and Q, combined, arranged and operated substantially as set forth.

The lever, S, and stirrup, T, in combination with the bevel gears, P and Q, substantially as set forth.

62,816.—BOILER-TUBE CLEANER.—John B. Christoffel, New York City.

First, I claim an improved tube cleaner formed by the combination of the series of spiral scrapers, C, the stationary head, B, and the movable head, D, with each other and with the rod, A, substantially as herein shown and described.

Second. The combination of one or more elastic or flexible scrapers, G, with the rod, A, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the coiled spring D, or equivalent, and adjusting nut, F, with the rod, A, and movable head, D, substantially as herein shown and described and for the purpose set forth.

62,817.—WINDOW-SASH LOCK.—J. K. Clark, Mount Pleasant, Iowa.

I claim the connected levers, g g', in combination with the friction rollers, d d', moving on inclines, c c', in the shell, A, arranged and operating as and for the purposes herein described.

62,818.—COMBINED RAKE AND SEEDER.—Robert J. Colvin, Lancaster, Pa.

First, I claim the manner of attaching the rake piece, J, and corn-planter devices, P and Q, to the grain drill frame, as herein described.

Second, I also claim the adjustable bar, M, to which the hoes are attached, with the shifting sections, Q, by which measure the machine when used for planting corn or raking hay is clear or free of all unnecessary machinery.

Third, I also claim the construction of the cylinder with its devices, U V T so as to sow grain in different quantities, and plant one or more rows, as described.

Fourth, I also claim the adjustable feed board or apron, H, as combined with the hopper by which the hopper, F, can be shifted without obstruction.

Fifth, I also claim the using of drag bars in connection with their rear attachments, N N, as cleaner for the rake.

Sixth, I also claim the construction of the shifting axles, X X, with their devices, Y Z, as arranged for the purpose of widening the drill frame, B, the proper width for the rake.

Seventh, I also claim the shifting rods, P P, for the purpose of removing the extra drag bars that should be dispensed with when the machine is operating as a rake or corn planter.

Eighth, I also claim the combination of the grain drill, corn planter, and hay rake so arranged as to be easily and quickly adjusted, as herein described and for the purposes set forth.

62,819.—MANUFACTURE OF IRON.—Anson G. Cook, Burlington, Vt.

First, I claim the rectifier or apparatus consisting of a chamber or vessel lined with fire brick provided with recesses, a, or their equivalent, substantially as described.

Second, The perforated cover, A', provided with the points or flanges for securing the lining of fire clay, substantially as described.

Third, The process, herein described, of treating fused metal in a closed vessel or chamber containing charcoal, or its equivalent, substantially as described.

Fourth, The employment or use of the compound of oxide of manganese and coal tar for the purpose of refining iron, substantially as described.

62,820.—MANUFACTURE OF SOAP.—Alfred A. Constantine, New Providence, N. J.

I claim the use of pine tar in its combinations with soap or soaps, and in the manufacture of soap or soaps, substantially as described.

I also claim as a new article of manufacture soap made with pine tar as one of its ingredients.

62,821.—CALORIC REGULATOR FOR BOILER FURNACES.—John Geo. Cooper and Edwin W. H. Cooper, Hartford, Conn.

First, We claim the heater, B', working cylinder, G, piston, H, and rod, I, in combination with the sliding spring rod, P, pusher rod, U, and damper, V, constructed and operating substantially as described, so that the position of the damper is regulated automatically by the expansion of the air or other elastic fluid in the heater.

Second, The regulating chamber, G2, in combination with the heater, B', working cylinder, G, spring rod, P, and damper, V, constructed and operating substantially as and for the purpose set forth.

Third, The arrangement of an adjustable piston, H', in the regulating chamber, G2, to operate in combination with the heater, B, B', and cylinder, G, substantially as and for the purpose described.

Fourth, The valves, E f, and trips, d e, in combination with the chamber, G2, cylinder, G, and rod, P, constructed and operating substantially as and for the purpose set forth.

Fifth, The spring catch, b, and recess, a, in the rod, P, arranged to operate in connection with the rod, G, and latch, W, substantially as and for the purpose described.

Sixth, The perforated plate, c', and regulating slide, i, in combination with each other and with the furnace door, A2, and rear shield, e', constructed and operating substantially as and for the purpose set forth.

Seventh, The sliding pin, l, and cam, l', in combination with the damper, V, and furnace door, A2, constructed and operating substantially as and for the purpose described.

Eighth, The chambers, b2 d1 f2, in the furnace door, A2, in combination with the damper, V, slide, i, shield, e', and perforated plate, g', constructed and operating substantially as and for the purpose set forth.

62,822.—FIELD ROLLER.—H. R. Crowe, Carondelet, Mo.

First. I claim hinging the frames, E and F, of the two end sections, A and B, to each other, substantially as herein shown and described and for the purpose set forth.

Second, Suspending the seat, K, by means of links, M, or their equivalent, from the springs, L, attached to the frames, E and F, of the roller, substantially as herein shown and described.

62,823.—MANUFACTURE OF GAS.—James Crutchett, Stroud, England.

First. I claim the manufacture of gas for lighting and heating purposes from pulverized or fine coal, or other carbonaceous materials injected into retorts or ovens in small quantities, either by separate successive injections or in small continuous currents, as herein described.

Second, I claim the injection into retorts or suitable ovens or chambers, of pulverizcd, powdered or small coal, saw dust, oils, or carbonaceous materials by means of steam supplied to such retorts in separate charges or in continuous currents, as herein described.

Third, I claim the injection of suitable carbonaceous materials, as aforesaid for the manufacture of gas into retorts, ovens or heated chambers by separate successive injections or currents by means of compressed atmospheric air, compressed gas, springs or other mechanical means, as hereinbefore described, whether the interiors of such retorts be under a slight pressure or vaccuum.

62,824.—CURTAIN FIXTURE.—John Cunningham, Philadelphi, Pa.

I claim the slide, B, fitted in a slot or opening, a, in the case, provided with a knob or pulley, C, at its outer side and with a rack, e, at its inner side into which a screw, C*, on a rod, D, gears, said rod projecting through the end of the case and having a thumb wheel, E, on its end at the exterior of the case, all arranged substantially as and for the purpose set forth.

62,825.—CONNECTING PISTON RODS FOR STEAM AND OTHER POWERS.—Edward P. Curtiss, Madison, Wis.

I claim the parallelograms, A A, the flanges, L L, that support them, the pin, B, that works on the angular sides of the parallelograms, A A, the pin, E, and slot, D, which moves the pin, B, to the opposite side of the piston, M, which reverses the motion, and the slot, C, which allows the piston rod, M, more stroke for the pin, B, to pass around the parallelograms, A A, coming in contact with their angular sides, forces the connecting rod, K, past the centers, to work, substantially as herein set forth.

62,826.—STEREOTYPE PLATE-HOLDER.—Alexander T. De Puy, New York City.

I claim, First, A block or holder for stereotype plates, constructed of sections in the manner substantially as herein shown and described.

Second, The combination of independent or detached clamps with a sectional stereotype plate holder, substantially as and for the purpose set forth.

62,827.—BRIDGE FOR BILLIARD TABLE.—Thomas Dolan, Albany, N. Y.

I claim a billiard table bridge having its resting or bearing surfaces for the cue for use of rollers, substantially as described for the purpose specified.

62,828.—SOAP.— G. H. Doney and Moses Clay, Lockhart, Ill.

We claim the use of the ingredients specified in the particular proportions and manner set forth to make soap.

62,829.—MACHINE FOR CUTTING THE ROLLS OF WINDOW BLINDS.—Lucius H. Dwelley, Dorchester, Mass.

First, I claim the arrangement of the vibrating hopper, F, which receives the sticks in mass, with magazine, G, which arranges them in a single column, so that they may be delivered one at a time to a carrier or holder that conveys them to the tool or tools that are to afterwards operate upon them, substantially as described.

Second, I also claim arranging within the magazine, G, or guide, 10, at one of its ends only, which guide arranges the sticks in a line at that end of the magazine, and allows all the inequalities in their lengths to project at the opposite end, substantially as described.

Third, I also claim the spring, r, with its rolls, q, in combination with its carrying disks, H I, substantially as and for the purpose described.

Fourth, I also claim the crank, P, with its eccentric, m, in combination with a slotted arm, K, and so arranged with a screw that when turned in a direction to throw the worm wheel, L, into gear with the wheel, O, it will clamp the arm, K, firmly in place, substantially as described.

Fifth, I also claim making the saw, E, adjustable on its arbor, D, by means of the split collar or sleeve, R, screw nut, v, with its recess, 14, and recessed collars, t u, substantially as set forth.

82,830.—CARDING ENGINE.—O. F. Fitch, Morristown, Ind.

I claim, First, The conductor armed with slender pendent points presented to the roping in rear of the condensing rollers, as herein shown and described as and for the purpose specified.

Second, The shaft, H, uprights, I I, and pendent points, a, in combination with the condensing rollers, D D D, spool, F, and frame, A, when constructed and arranged as herein set forth and for the purpose specified.

62,831.—PORTABLE HOUSE.—Daniel Fitzgeral (assignor to himself and R. Onderdonk), New York City.

I claim the cap, F, provided with grooves as represented when used in combination with the boards, A, A, the upper ends of which are held by said cap and which are bent to form the roof and sides of the house, said boards being prevented from warping, substantially as herein specified.

62,832.—BUCKLE.—Merwin Fowler, Wolcottville, Conn.

I claim a buckle formed of wire bow, a, attaching bow, b, and clamping bow, c, formed with eyes, e, passing around the wire of the bow, at the return bends, x, as and for the purposes specified.

62,833.—MACHINE FOR WASHING SAND AND OTHER MATERIALS.—David L. Furmer, Rostraver, Pa.

The combination of the inclined trays, A A, and stirrers, L L, constructed and acting conjointly, substantially as and for the purpose set forth.

The combination of the inclined trays, A A, and spouts, Y Y, or their equivalents to supply each tray separately with pure water, substantially as and for the purpose set forth.

The trays, A A, when located one above another and pierced centrally by the shaft, k, upon which the stirrers are located so as to wash and rewash the sand without rehandling the same and without occupying more space than the area of one tray requires, substantially as set forth and described.

The agitating screen, S, in combination with stirring mechanism of a sand washer to communicate the sand and earthy matters before being submitted to the action of said stirring mechanism, substantially as set forth.

The trays, stirring mechanism, water spouts, screen, driving gear and frame work herein set forth and described to form a machine for washing and cleaning sand of other earthy matters, usually mixed with it.

62,834.—CORN AND COTTON SEED PLANTER.—Charles C. Garrett, Dayton, Ala.

First, I claim the stirrup lever, R, connected to the cylinder, Q, so that it can be raised and lowered, substantially as and for the purpose herein described.

Second, I claim the stirrup lever, R, and its connections with the seed cylinder, Q, in combination with the lever, O, for the purposes and substantially as described.

Third, I also claim the harrow, C2, and its means of attachment to the springs, D2 D2, in combination with the seed planter when constructed in the manner and for the purposes and substantially as described.

62,835.—PLOW.—Lewis Gibbs (assignors to Bucher Gibbs & Company), Canton, Ohio.

I claim uniting the beam and handle of a plow by means of the castings, d f, and their lips, e g, and a screw bolt, I, substantially as described.

I also claim the beveled edges of the socket, j, with the beveled edges of the coulter, D, and the screw bolts, k, for the purpose of holding and tightening the coulter, substantially as described.

I also claim the bar, m, made and united to and with the land side and share, substantially as and for the purpose described.

62,836.—GARBAGE BOX.—Marshall Gilbert, New York City.

I claim the vessel, c, formed with a ring or ledge, e, in combination with the movable grating, f, and receptacle, g, the whole constructed and applied in the manner specified to form a receptacle for ashes and other refuse matter.

62,837.—LOW WATER DETECTOR.—James E. Gillespie, Boston, Mass.

First, I claim the hollow springs, g f, or their equivalents, in combination with the tank and boiler as specified.

Second, I claim the combination of the pipes and springs, g f, and tank, e, with the whistle of a boiler, whereby to raise an alarm in case of low water.

62,838.—HARVESTER RAKE.—William F. Goodwin, Washington, D. C.

First. I claim the gear wheels, A A1 A2 A3, and A4 shaft, B5, crank, B6, lever, D and L' and block, M, arranged to operate in the manner and for the purpose, substantially as described.

Second, The yoke, A7, rod, A8, and vibrating arm, A9, arranged to operate in the manner and for the purpose substantially as described.

Third, The bars or levers, B B' B2, B3 and B4, crank, B5, and post, B6, with the rake, B7, attached, arranged and operating in the manner and for the purpose, substantially as described.

Fourth, The switch, S, and tracks, T and T', arranged on the side of a circular platform to operate in the manner and for the purpose substantially as described.

Fifth, The rake head, B7, hinged or jointed to the reciprocating and turning post, B6, arranged and operating substantially as and for the purpose described.

Sixth, The arrangement beneath the grain platform of the mechanism for communicating motion to a reciprocating, turning and lifting rake which operates from above, upon the platform, substantially as described.

62,839.—MACHINE for BENDING CABLE LINKS.—R. M. Green, Baltimore, Md.

First, I claim the slotted lever, D, provided with the wheels or pulleys, J J' in combination with the former, C, arranged as and for the purpose specified.

Second, The arrangement of the set screw, P, with the power, C, and lever, D, substantially in the manner and for the purpose herein specified.

62,840.—FENCE.—C. S. S. Griffing, Geneva, Ohio.

I claim, First, The frame, A, provided with wires, C C', and compensating loop, k, as constructed and arranged in combination with the brace post, D, for the purpose and in the manner as described.

Second, I claim in combination with the above, the pannel, A', constructed and arranged in the manner as described.

62,841.—STEAM TRAP.—John Hague, Providence, R. I.

I claim the hollow valve stem, C, constructed and arranged substantially as described in combination with the air and water valves, B and E, and operated substantially as herein set forth.

62,842.—DINNER BUCKET.—Joel Haines, West Middleburg, Ohio.

I claim a victual and provision bucket made with a double bottom or permanent horizontal partition to divide it into two apartments one above the other with a door in the side of the bucket opening into the lower division or apartment, substantially as described.

I also claim the cleats in the lower apartment in combination with the pans or trays.

62,843.—WRINGER FOR CLOTHES AND MOPS.—Lewis Hannum, Cortland, N. Y.

First, I claim the rolls B C, and links, D, arranged relatively to the arms, E2, on the shaft, E, which latter is adapted for being partially rotated at will, all substantially in the manner and for the purpose herein set forth.

Second, I claim in connection with the above, the hand lever, E' foot lever, G, and connection, G' arranged substantially as and for the purpose herein specified.

Third, I claim the board, D' carried on the links, D, and arranged to serve relatively thereto, and to the rolls, B C, which are opened and closed thereby, substantially as and for the purpose herein specified.

62,844.—MACHINE FOR MAKING CHEESE BOXES.—Thomas Hanvey, Elma, N. Y.

I claim the hinged section, D', constructed and operating in the manner and for the purpose, substantially as set forth.

62,845.—GRAIN REGISTER.—L. O. Hayworth, New Cumberland, Ind. Antedated Feb. 28, 1867.

I claim the combination of the wheels, B B B, with ratchet center pieces of varying diameters and teeth, the wheel, A2, sliding frame, I, swinging pawls, J K, rod, B2, slotted arm, L, and arms, N O, operated with the grooved side bar, S, of the carriage, P, substantially as described, for the purpose specified.

62,846.—MACHINE FOR CUTTING HEADS AND BOTTOMS OF WOODEN BOXES.—Edmund Hersey, Hingham, Mass.

I claim having the edge of the cutter C, formed of two gouge-shaped parts, substantially as and for the purpose shown and described.

62,847.—CAR BRAKE.—Aaron Higley, South Bend, Ind.

I claim the ratchets X, and 2, in combination with windlass 7, substantially as and for the purpose set forth.

62,848.—CORSET CLASP.—Lucian Hill, (assignor to Lawson M. Hill,) North Brookfield, Mass.

I claim the detachable clasp for corsets herein described consisting of the parts a a, and spring b, constructed as set forth.

62,849.—AUGER.—T. Hofstatter, Jr., New York, N. Y.

I claim the countersink b, washer C, and thumb screw d, when constructed and arranged upon the screw thread a, of the auger A, and operating as herein set forth for the purpose specified.

62,850.—SELF ATTACHMENT FOR BERTHS.—Edwin Hoyt and Edward P. Whitney, Stamford, Conn.

We claim the device herein described of the arm B, and folding step C, constructed substantially as herein specified, to serve as a resting place for the foot for facilitating ascent to and descent from berths in steam and other vessels and railway vehicles.

62,851.—WRINGING MACHINE.—R. B. Hugunin, Cleveland, Ohio.

First, I claim the arrangement and combination of the double gear wheels A, and single gear wheels B, C and D, and toggles E E, or their equivalents as described, for the purpose described.

Second, I claim the arrangement and combination of the stiffening bar P, spring bars K and L, bolts M M, spring collars N N, and adjusting screws O O, as described, for the purposes specified.

62,852.—BOILER FORM.—John S. Jennings, Medina, N. Y.

I claim the rim f, and lips d, the double acting screw b b', and the dowels a a, when combined with the two heads a a, the whole arranged and operating as herein set forth

62,853.—GOVERNOR.—Oliver A. Kelly, Slatersville, R. I. assignor to Lamb, Cook & Co.

First, I claim the weighted shoes F, in combination with the pauls b, b' dovetailed teeth a, of the ratchet 47 wheel B, lever G, rod H, and governor I, all constructed and operating substantially as set forth.

Second, I claim the cam groove D, in combination with the arm C, pawls b b', ratchet gear B, shoes F lever G, rod H, and governor I constructed and operating substantially as and for the purpose described.

Third, The yielding or self-adjusting shoes F, in combination with the pawls b b', dovetail teeth a, of the ratchet wheel B, lever G, rod H, and governor I, all constructed and operating substantially as and for the purpose set forth.

62,854.—WASHING MACHINE.—Gilson Keyes, (assignor to himself and F. T. Payn,) Binghamton, N. Y.

I claim the combination and construction of the seeds box A, with the lever E, notched handle of the rubber B, and mode of securing the convas apron by means of the slides C C as described and for the purpose set forth.

62,855.—APPARATUS FOR CARBURETTING GAS AND AIR.—Joshua Kidd, London, Eng.

I claim as new for carburetting gas or air by heat at the burner for obtaining light forming the apparatus with a heating aperture through its center, also with heat regulator D, together with the application of oil supplying arrangement substantially as described.

62,856.—APPARATUS FOR FORMING AN EXPLOSIVE MIXTURE OF AIR AND HYDROCARBON VAPORS FOR USE IN MOTIVE POWER ENGINES.—Joshua Kidd, London, Eng.

I claim as new for the purposes of this invention the general arrangement of apparatus substantially as described and set forth.

62,857.—CORN SHELLER.—Martin, C, Kilgore, Washington, Iowa.

I claim a corn sheller having a box as described with plate a, springs d, b, bar c, and my device as described for the egress of cobs, all constructed, combined and arranged substantially as herein specified.

62,858.—POTATO DIGGER.—H. J. Kintz, Greece, N. Y.

I claim the construction, combination and arrangement of the scraper A, consisting of the vertical side points a a, the central share b, extending backward and upward in a semi-circular ridge with its point projecting below the level of the side points, and the intervening shallow scoops with concave edges c c, and gradual upward inclination between the side and central points operating substantially in the manner and for the purposes herein set forth.

In combination with the scraper constructed and arranged as above described. I claim the double conical sifter E, and its cogged driving wheel G, operating in the manner and for the purpose specified.

I also claim the hinged adjustable and self-supporting conductor H, provided with the converging fingers p, and the concave k, when combined and arranged with the double conical sifter E, in the manner and for the purpose set forth.

I also claim the special arrangement of the machine, consisting essentially of the scraper A, with draft arms D, the sifter E, with driving wheel G, the conductor H, and the vine clearers I, operating as herein described.

62,859.—TOOL FOR CUTTING OFF BOILER TUBES.—Richard Lavery, South Boston, Mass.

First, I claim the eccentric cutter B, in combination with the head A, constructed and operating as and for the purpose described.

Second, The lip or nose e, on the eccentric cutter in combination with the shoulder f, in the head A, substantially as and for the purpose set forth.

Third, The pin c, provided with a key c, in combination with the eccentric cutter B, and head A, constructed and operating substantially as and for the purpose described.

Fourth, The ratchet handle D, in combination with cogs g, in the head A, and with the eccentric cutter B, constructed and operating substantially as and for the purpose set forth.

62,860.—APPARATUS FOR REFRIGERATING, COOLING AND PRESERVING.—Peter Lawson, Lowell, Mass.

First, I claim an upright shaft with one or more tables or shelves and suitable means to revolve the same in combination with the interior of a refrigerator, provision safe, or preserving house or similar structure, substantially as herein set forth and described.

Second, One or more shelves M, rack h, pinion g, in combination with the body of a refrigerator or similar structure substantially as herein described and set forth.

Third, The combination in a refrigerator or like structure of one or more revolving tables C, with one or more movable shelves M, substantially as herein set forth and described.

62,861.—LANTERN.—Francois Leclere, (assignor to himself and J. S. Letrerd,) Watertown, N. Y.

I claim the combination of the bail F, with its eyes f, the wire G, and spring I arranged with the slotted chamber H, operating with the lamp A, and its flange a, all constructed and arranged in the manner and for the purpose herein described.

62,862.—COMBINATION PAD-LOCK.—Austin Leyden, Atlanta, Georgia.

First, I claim the disk bolt A, constructed substantially as described with indicating letters upon one side and the latch B, attached to the other side, and operating substantially as herein shown and described.

Second, I claim the catch C' C'' attached to the shell of the lock substantially as described in combination with the disk bolt A, for the purpose specified.

62,863.—LOCK SEAL.—Albon Man, Brooklyn, N. Y.

First, I claim a seal for lock seals or other analogous purposes, where it is important to keep a record of the number and kind of seals used, and the times, places and circumstances of the use thereof by the preparation of the seal upon a slip of paper with a marginal Register on which all the said facts may be noted.

Second, I claim constructing said seals variantly so as to operate as a check upon counterfeiting and so that it can not be known which design is used in any given case except by the person using it and by the record.

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Third, I claim these varient designs combined in pass books on slips of paper, so as to allow a permutation of the designs for further security.

62,864.—BEER FAUCET.—Thomas Marsh (assignor to himself, John Balchom, and S. Perry), Smithfield, R. I.

First, I claim the faucet composed of the two parts, 1 and 2, the part, 1, to be attached to the barrel at any time after the filling and before the tapping of the same, and to act in combination with the part, 2, in forcing out the common wooden plug, the use of which is rendered unobjectionable by my invention, and which it is no part of my design to supersede.

Second, The combination of such faucet with a collar, C, affixed to the cask, such parts in combination constituting an apparatus for tapping a cask, substantially as described.

Third, Combining with the apparatus described in the first clause, a cutting bit, F, substantially as described for the purpose specified.

65,865.—SAFETY KEY HOLDER FOR DOOR LOCK.—Franklin J. May (assignor to himself and J. G. Barnum), Morrisania, N. Y.

I claim the weighted pawl, H, in combination with plate, E, operating directly against the square shank of the key, substantially as herein represented and described.

62,866.—MEASURING FUNNEL.—George W. McCann, Springfield, Ohio.

First, I claim the scale, I in combination with the cup, A, of a funnel, when said scale is constructed substantially as described, and retained in place by a spring pressure against the side of the cup.

Second, The guide bridge, E, in combination with the valve, C, stem, D, and cup, A, of a funnel, when constructed so as to be readily removable, substantially as and for the purpose set forth.

Third, The removable base, L, in combination with a cup and nozzle of a funnel measure, substantially as and for the purpose set forth.

Fourth, The nozzle, J, of a funnel constructed with the wire, k, wound spirally about its outer surface for the purpose of permitting the air to escape upward by the side of the nozzle, as set forth.

Fifth, The combined cup, funnel, and measure, constructed and arranged as set forth.

62,867.—HORSE-SHOE.—Donald L. McDonell, Detroit, Mich.

I claim the combination of the iron shoe, having a continuous groove in its upper surface, and spurs projecting upwardly therefrom, with the elastic shoe, having a contiguous tongue fitting said groove, all constructed and arranged as described.

62,868.—CULTIVATOR.—C. F. Megquier, Eureka, Ill.

I claim the plow standards, F F, pivoted at their upper ends, in metal straps, c. which encompass loosely the shaft, G, in the frame, A, so that said standards and the plows, H, attached may be moved vertically and laterally in combination with the plow standards, I I, pivoted to the outer sides of the frame, A, the lever, k k, to which the plow standards are connected, and the rods, N, attached to the plow standards, all being arranged to operate in the manner substantially as and for the purpose set forth.

62,869.—AUTOMATIC WAGON BRAKE.—W. D. Miller, Enon, Ohio.

First, I claim the axle, G, and slotted bolster, H, in combination with the rollers, J, substantially as and for the purpose set forth.

Second, The automatic brake, A, operated by means of the connecting rod, C, and the axle, G, in combination with the slotted bolster, H, slotted perch, I, and bolt, F, as and for the purpose set forth.

62,870.—FLOATING BATTERY OR LIGHT SHIP.—John Moody, York, England.

I claim the construction of floating lights, beacons, floating batteries, and other vessels with radiating arms, as described, for the purpose of preserving their steadiness in a rough sea, as herein set forth.

62,871.—BED BOTTOM.—Thomas B. Moore, Bridesburg, Pa.

First, I claim an improved spring for bed bottoms formed by combining the spring, B, having a loop or hook, b', formed upon its upper end, with the bar, C, and ears, D, having notches formed in their rear sides, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the loops or bridles, F, with the springs, B, substantially as herein shown and described and for the purpose set forth.

62,872.—STRAINER.—Frank Morton, Kingston, Mass.

I claim the arrangement and combination of the handle, C C', with the strainer cloth, A, and the supporting frame, B B' B".

62,873. — BREECH-LOADING FIRE-ARM.—Alfred S. Munger, Chicopee Falls, Mass.

I claim the lever catch, G, formed with the foot, g, which in the act of firing is interposed between the back of the hammer and the post, c, of the frame to relieve the pivot, b, of the pressure, and in the act of cocking is retracted to release the hammer, as and for the purposes described.

62,874.—TUBE GEAR FOR OSCILLATING ENGINES.—James H. Murrill, Baltimore, Md.

I claim the arrangement of the arc, e, lever, D, valve rod, d, crank shaft, F, and oscillating cylinder, A, substantially as described and for the purposes set forth.

62,875.—HARROW.—George Ogg, Lacon, Ill.

I claim the manner of connecting the arms with each other by the bolts, B, and rings, D, and the arrangement and combination of the chain, E, passing through the ring, D, by which any width of harrow desired may be readily effected.

62,876.—CANE STRIPPER.—I. E. and J. A. Overpeck, Overpeck's Station, Ohio.

I claim, First, The double-edged knife, arranged and operating in combination with hook, a, for cutting and stripping stalks, substantially as and for the purpose described.

Second, The handle, b d, and shield, A A', in combination with a hook and knife arranged, substantially as specified for the purpose set forth.

62,877.—MACHINE FOR REMOVING BURRS FROM WOOL.—Ziba Parkhurst, Milford, Mass.

I claim the application of the induction plate, G, or its equivalent to, or its combination with the burring machine so as to operate with the main cylinder thereof, substantially as and for the purpose specified.

I also claim the combination and arrangement of one or more combs with the burring machine, so as to operate with the main cylinder thereof, substantially as and for the purpose hereinbefore explained.

I also claim the application of the induction plate and combs, or either of them, to the burr box so as to be movable therewith as described.

62,878.—PREVENTING INCRUSTATION OF STEAM BOILERS.—George T. Pary, Philadelphia, Pa.

First, I claim the mode, substantially as described, of removing the scale from, and preventing the incrustation of, boilers by means of electricity generated without the boiler by jets of steam impinging upon one or more points or equivalent means, said electricity being conducted into the boiler by suitable means.

Second, The combination of the try cock, B, and the insulated brush of points, H, set in the bulb, G, or its equivalent, when connected by a suitable conductor, K, with the shell of the boiler, and arranged to operate substantially in the manner and for the purpose set forth.

62,879.—REIN HOLDER FOR CARRIAGES.—Elias C. Patterson, Rochester, N. Y.

I claim the improved rein holder, constructe substantially as described.

62,880.—FID.—H. H. Pember, New York City.

I claim the fid consisting of a series of transversely divided sections, B, of conical form, resting on each other, fitted on the shaft, C, and adapted to receive the thimble between the sections relative to size, substantially as represented and described.

62,881.—PLOW.—Daniel Peters and John W. Pauly, Keokuk, Iowa. Antedated March 4, 1867.

We claim the combination of the friction wheel, H, and adjustable supporting bar, G, with the moldboard, E, of the plow, when said wheel and bar are constructed and arranged substantially as herein shown and described and for the purpose set forth.

62,282.—CALCULATING MACHINE.—Albert C. Pierson, Rahway, N. J.

First, I claim, in calculating machines, presenting to the eye only the columns which are wanted to complete the units, tens, etc., substantially as herein specified, when the several columns for each of the nine digits, with the blank column for the cipher, are arranged to be presented simultaneously so that they may be read off for units, tens, hundreds, etc., and added mentally, with the ease and rapidity of adjustment and of use, herein set forth.

Second, I claim the belt or sliding calendar-column, E, when used in combination with columns of calculated interest, or equivalent calculated columns, the quantities in which vary according to the number of days, substantially as and for the purpose herein set forth.

Third, I claim the combination of the bar, G, having a parallel motion, with the several columns on the rollers, B C and c, with or without the columns, M, or other columns, substantially as and for the purpose specified.

Fourth, I claim the slide, I, fitted on the bar, G, and adapted to operate in combination with calculated columns so as to expose different columns according as it is moved, and allow only one to be visible for the units, one for the tens, etc., at one time, substantially as and for the purpose herein specified.

62,883.—MACHINE FOR BORING AND TENONING.—Thomas Place, Alfred Centre, N. Y.

I claim the sliding carriage, D, having adjustable rack, i, adaptable stop, n, and elbow lever, k, and operated by the treadle, h, and operated substantially as described for the purpose specified

62,884.—CIDER MILL.—E. S. Purdy, Croton, N. Y.

I claim the alternate arrangement of the teeth, a a', on the cylinders, B B', the teeth of one cylinder passing closely between the teeth of the other cylinder, and adapted for grating the fruit instead of crushing it, the whole being constructed, arranged, and operated substantially as and for the purpose set forth.

62,885.—STEAM GAGE.—Emmett Quinn, Washington, D. C.

First, I claim the tubes inserted in plates as described, with the channels cut therein from one tube to another, and with the cap or outer plate covering the channels and ends of the tubes, as and for the purpose described.

Second, The packing and diaphragms between the plates with the plungers for the purpose of cutting off communication between the tubes, as described.

Third, The means provided for adjusting the mercury in the final or index tube to the zero point on the scale, or for adjusting said zero point to the mercury, in the manner described.

Fourth, The construction of the index tube by a combination of a back piece, containing a groove of a suitable caliber, with a glass face cemented to or clamped thereon, in the manner substantially as described.

Fifth, The construction of channels from tube to tube of a size sufficient for the necessary operation of the gage, but too small to allow of a rapid movement of the fluids when pressure is suddenly applied.

62,886.—CORN PLANTER.—Leonidas M. Reamy, Kokomo, Ind.

First, I claim, in the described combination, the two ridging shares, c c', followed by the seed-dropping drill, E, substantially as and for the purpose set forth.

Second, A corn planter, consisting of two shares, c c', making a central ridge on which to plant, combined with the drill, E, and crescent-shaped rake, H, the whole arranged and operating substantially as set forth.

Third, In this connection, I claim the crescent-shaped grain coverer or rake, H.

62,887.—GLASS FURNACE.—Samuel Richards, Philadelphia, Pa.

First, I claim the furnace constructed with doors and of the width described, in combination with the tapering pots, the whole arranged and operating in the manner and for the purpose substantially as described.

Second, Constructing refining pots with the projections, b, with or without the strainer, c, in the manner and for the purpose substantially as shown and described.

62,888.—CORN PLANTER.—Josiah S. Rickel, Genesee, Ill.

I claim the seed slide, G, placed within a chamber, c, in the tube, F, having a hole, d, made through it and operated by the levers or hands, E E, in combination with the fixed partition, H, provided with an elastic projection, i, and flap, I, and the recess, e, with a glass, f, at its outer side, all arranged substantially as and for the purpose set forth.

62,889.—CONSTRUCTION OF DIKES AND LEVEES.—Louis S. Robbins, New York City.

First, I claim the employment of a removable cap, D, substantially as and for the purposes herein shown and described.

Second, I claim the employment of a grinding clamp, E, or its equivalent, in one or more parts, substantially as shown and described.

Third, I claim the combination of one or more longitudinal timbers with the lower portions of the upright planks or timbers, substantially as and for the purpose herein shown and described.

62,890.—TORPEDO FOR OIL WELLS.—Edward A. L. Roberts, Titusville, Pa.

First, I claim the combination of the quick match, F, with the priming chamber, H H, for the purposes set forth.

Second, I claim the torpedo with the priming chamber, in combination with the quick match, substantially as and for the purposes set forth.

62,891.—METHOD OF DRIVING WELL TUBES.—Ezra M. Robords, Avoca, N. Y.

I claim the metallic case or cap, C, provided with a block or plug of zinc, c, or its equivalent, substantially in the manner and for the purpose as herein set forth.

62,892.—TRAVELING BAG.—E. A. G. Roulstone, Roxbury, Mass.

I claim the construction of the frame with the groove or recess, c', to receive the edge of the leather or cloth body, b, and the confining strip, d, all being formed, arranged, and connected together, substantially as set forth.

62,893.—FLUID EJECTOR.—Joseph Ryan, St. Louis, Mo. Antedated Feb. 27, 1867.

First, I claim the method of economising the heat produced by the condensation of steam in a syphon, by application thereof to one or more air currents, then caused to act in combination with the steam current or currents upon the fluids to be raised, substantially as set forth.

Second, The arrangement of the tube, F2, its feed of steam and stop cock, or their equivalents, with the tube, f2, its feed of air or throttle valve, or equivalents, in such a manner that the steam current shall impart to the air current velocity and heat, and bring said air current in acting contact with the water to be discharged, thus avoiding greater loss of power by condensation which would ensue if steam alone were used, substantially as set forth.

Third, The tube, F2, arranged to utilize the expansion of steam by widening the inner diameter thereof, substantially as set forth.

Fourth, The globes or other increases of surfaces of the air feed tube, f2, thus favoring an expansive action of air, substantially as set forth.

Fifth, The combination of the supply pipe, g', the steam chamber, G, stop cock, g, and feed pipes starting from G, for the purposes described.

Sixth, The arrangement and combination of the chambers, F, the bulbs, E, with the necks, A5, and the bulbs, C and D, when used as set forth.

Seventh, The arrangement for packing the valve rods to effect the perfect exclusion of air from the vacuum, the same consisting of a stuffing box, arrangement, c1 c2 and c3 (fig. 4), and this surrounded by a liquid usually water, as in c4, and this backed by a second stuffing box, as at c6 and c7, or any equivalent arrangement which uses a liquid to prevent the egress and ingress of air, in combination with some mechanical stuffing box contrivance to prevent the leakage of the air-checking fluid.

Eighth, The combination of the male and female screw parts, c and c, of the valve stem, c, with the pin, c, worm wheel, c8, worm shaft, c9, and hand wheel, c10, as and for the purposes set forth.

Ninth, The joint of the pipe, D, with the root piece, D", by means of a flange, d', and lead cement, or equivalents, filling the space surrounding d', of D', substantially as described.

Tenth, The valve ball, b2, when arranged of an inner wooden kernel and coated with vulcanized rubber, or its equivalent, as set forth.

Eleventh, The combination of the bulb, B, diaphragm on plate, b', and drop valve, b2, as and for the purpose set forth.

62,894.—PLANKING SCREW.—George Savage, Jr., Bangor, Me.

First, I claim the planking screw consisting of lever, D, with the prop or fulcrum, E, screw, F, and dogs, d d, attached to lever, D, by the clevis, G, or its equivalent, all arranged to operate in manner substantially as described and shown.

Second, The rollers, a a a, in fulcrum, E, in combination with sliding clevis, G, whereby to allow the adjustment of screw, F, substantially in manner as and for the purposes specified.

62,895.—WASHBOARD.—David Smith, Hartfield, N. Y.

I claim the combination of the hinged pressure board and lever, C e, hand rubber or rubbers, f, and rod or rods, g, with the washboard, A, arranged and operating substantially as and for the purposes described.

62,896. — DAMPER. — James Smith and Samuel C. Brown, Richmond, Ind.

First, We claim a conical or bell-shaped damper, constructed and applied substantially in the manner set forth.

Second, We claim the internal pipe, A, when provided with a damper and arranged substantially as described and for the purposes set forth.

62,897. — PUNCHING MACHINE. — Oliver Snow (assignor to the Meriden Manufacturing Company), West Meriden, Conn.

I claim the combination of the wrist box, D, adjustable center piece, E, and endless screw, I, operating substantially in the manner and for the purpose specified.

62,898.—CULTIVATOR.—Alexander F. and T. M. Stansbury, Louistown, Ill.

We claim the slotted shoe or bearer, F, the double trees, K and G, the clevis, H, draft rods, I, and pendent staples, J, all substantially as and for the uses and purposes hereinbefore set forth.

62,899.—CHURN.—B. B. Stanton, Scott, N. Y.

I claim the churn box, A, with the eccentric frame, s s e e, and teeth, m, the shaft, W, with its arms, t t t, operated by the wheels, B y x and d, when constructed and used in the manner substantially as specified.

62,900.—METHOD OF ATTACHING HOES TO THEIR HANDLES.—William H. Startzman, Big Lick, Va.

I claim attaching the handle, C, having its lower edge wedge shaped to the hoe, A, by means of the wedge-shaped eye, B, tongued cap, D, nut, E, and bolts and nuts, F G, as herein shown and described.

62,901. — APPARATUS FOR MAKING EXTRACTS. — Abraham Steers, New York City, assignor to himself, Henry L. Elder and S. H. Kennedy, Philadelphia, Pa.

First, I claim the revolving brush, F, in combination with the still, A, and coil, C, constructed and operating substantially as and for the purpose described.

Second, The floating rake, G, in combination with the still, A, constructed and operating substantially as and for the purpose set forth.

62,902.—HAWSE-PIPE STOPPER.—James Stewart, Bangor, Me.

I claim the plates, a a, in combination with hawse pipe, B, when arranged to operate in manner substantially as described and shown.

62,903.—REVOLVING TABLE.—James Stewart, Bangor, Me.

I claim the combination of table, A, desk, D, and arm, k, in manner substantially as shown and specified.

62,904.—HARROW.—Svan Svanson, Sweedepoint, Iowa.

I claim the frame, a, carrying the toothed rollers, B B B, adapted to be reversed and drawn along the surface of the ground by the top side becoming the bottom, in the manner and for the purpose specified.

62,905.—CHURN POWER.—Henry Swarthout, Altay, N. Y.

First I claim the arrangement of the roller, E, lever, F, and pivot box, C, when applied and used as specified, and for the purpose of changing the inclination of the wheel, H, as set forth.

Second, I claim roller, I, lever, J, and weight, K, when made and applied as and for the purpose herein specified.

62,906.—IRONING MACHINE.—Joseph W. Thorp, Sanbornton Bridge, N. H.

I claim the compound levers, e h g, provided with handle, d, the end of the levers, e e, being pivoted to bar, c, which is connected to swinging arm, D, by a swivel joint, and the end of levers, g g, being connected to the guides, a a, which slide in sleeves, b b, in combination with the iron, E, the whole operating substantially as described and for the purpose specified.

62,907.—BOOTS AND SHOES.—George W. Tolhurst, New York City.

I claim the counter, D, heel, E, shank, E, and slide flanged strips, G, made of one piece of metal, in the manner described for the purpose specified.

62,908.—KNOB LATCH FOR DOORS.—Albert W. Upton, Lowell, Mass.

I claim the combination of the inclines, a a, and the projections, c c, on the rear end of the latch bolt, B, and the horns, e e, on the tumbler, A, with the sliding arbor and knobs, the whole arranged to operate substantially as and for the purpose set forth.

62,909.—LIFE PRESERVING RAFT.—C. W. Wailey, New Orleans, La.

I claim a life preserving raft embracing the combination of the bars A A A, with the cross pieces B B B, etc., (so grooved as to receive the chime of a barrel) and mortices a a a a. The slats D D D, with pin holes and pins the ropes f f, the bolts c C C C. with hand nuts d d d d, and the barrels E E E E, all arranged and constructed as specified for the purpose herein before set forth.

62,910.—MITER BOXES.—W. S. Wheeler and S. E. Bickford (assignors to S. E. Bickford and F. Flanders), Franklin, N. H.

We claim the guide frame E, so hung and pivoted to a standard A, that it can be swung around an axis vertical to the work, and also inclined to the said vertical axis whereby the proper direction can be given to the saw to cut a miter or a bevel, or both simultaneously, substantially as set forth.

We also claim providing the frame E, with an index or indices for fixing or adjusting its position around its vertical axis or at the required inclination for a miter or a bevel, in combination with a suitable clamp or clamps or equivalent mechanical device for locking it when adjusted substantially as set forth.

62,911.—CAR STARTER AND BRAKE.—John Wiley, 2d, South Reading, Mass.

I claim the slide E, provided with the oblong opening a, and cylindrical projection b, working through the cross bar c, spring F, wheel D, upon the axle C, treadle K, eccentrics I I, sliding bar H, chain e, and windlass G, when all are constructed and arranged to operate as herein set forth for the purpose specified.

62,912.—CAR BRAKE.—John H. Williams, Somerville, N. J.

I claim the drum, I, lever, K, spring, T, chains, H. J and N, when all are constructed and arranged as herein set forth for the purpose specified.

Second, The arrangement of the lever, c, connecting chains or wires, d, and horizontal swinging arm, g, in combination with the pawl, W, substantially as described for the purpose specified.

Third, The foot lever, y, connected with the brake chain and arranged substantially as and for the purpose described.

62,913.—PEN HOLDER.—Orin O. Whitherell, Plaiston, N. H. assignor to himself and J. B. Bracket, Lewiston, Me.

I claim the application of the tongue or ink retainer to the pen and its carrier in the manner so that the said retainer may be movable and adjustable with respect to the nib of the pen, as set forth.

I also claim the construction of the pen carrier with the depression or notch, a, and the terminal slots, b b, arranged together and in it and for the reception and holding of an ink retainer to operate with the pen as specified.

62,914.—TILE AND PIPE MACHINE.—Richard Woodcock, Joliet, Ill.

First, I claim the self revolving core shaft, c, in the hollow shaft, b.

Second, The receiver, i, answering the double purpose of receiving the tile from the mill and holding the same while in a green state.

Third, A combination of the self revolving core shaft, c, the main shaft, b, and the receiver, i, when used and operating substantially as described.

62,915.—COAL SCUTTLE. — D. Wright and W. A. Kirby, Auburn, N. Y.

First, We claim the use of a lip or flap as a part of the coal scuttle and in front thereof so that the coal may be discharged through an aperture the bottom of which shall be at a level sufficiently below that of the upper edge of the scuttle, substantially in the manner described.

Second, the manner of affixing the said lip to the scuttle, substantially as above described.

62,916.—MODE OF APPLYING MEDICINES AND REMEDIAL AGENTS, AND AN APPARATUS THEREFOR.—John Allen, M.D., New York City.

First, I claim the peculiar construction and arrangement of the apparatus for administering vapor baths, substantially as hereinbefore described, and for the purposes set forth.

Second, The peculiar construction and arrangement of the bath armor, No. 1, the frame, flexible impervious casings and hood, and the armor, No. 2, body and hood or head box, with glass front, substantially as hereinbefore described, and for the purpose set forth.

Third, The flexible supply and escape pipes, combined and arranged with the apparatus, substantially as described, and for the purposes mentioned.

Fourth, The gasoline stove, or other suitable device, the heat of which can be readily graduated, in combination with a boiler or retort for generating vapors for vapor baths, substantially as described.

Fifth, The combination and arrangement of the cup, with water in it, lamp and plate, constituting the sulphur vaporizing apparatus, substantially as described, and for the purposes stated.

Sixth, The introduction into a boiler or retort, of medicines which are soluble in water, or which may be vaporized by a moderate degree of heat, particularly the perchloride of mercury (otherwise known as corrosive sublimate) and iodide of potassium, together or separately, and their compounds or equivalents for converting them into vapor, substantially as hereinbefore described, and for the purposes set forth.

RE-ISSUES.

2502.—GALVANIC BATTERY.—Edward A. Hill, Chicago, Ill. Antedated April 9, 1862. Patented August 18, 1863.

I claim the combination and arrangement of the battery cup, and the positive and negative electrodes, as and for the purposes specified.

2503.—PRESERVING FRUIT, MEAT AND OTHER SUBSTANCES.—Nathaniel S. Shaler, Cambridge, Mass. Patented Oct. 11 1864.

First, I claim the preservation of animal, vegetable or other matter liable to decay in the ordinary atmospheric air and temperature by means of carbonic acid gas and a refrigerating temperature together and relatively to such substances substantially in manner as herein before set forth.

Second, Also the combination of a preserving chamber, a, a moisture refrigerating apparatus and a means of circulating the carbonic acid gas of such chamber through or so in contact with the surfaces of the refrigerating apparatus as to not only cool the gas but cause such moisture to be frozen or condensed and abstracted from the gas substantially as specified.

Third, Also the preservatory as constructed of one or more dumb waiters or elevators D, or the equivalent thereof, the gas chamber A, the gas refrigerating apparatus E, and the gas circulating apparatus, the whole being arranged and combined substantially as and so to operate in manner and for the purpose specified.

Fourth, I also claim carbonic acid gas as a means of preventing or arresting decay in animal or vegetable matter when proper buildings or compartments are filled with such gas to the exclusion of atmospheric air and the substances to be preserved are placed and kept therein for this purpose.

2504.—SUBMARINE TUNNEL.—The American Submarine Tunnel Company, New York City, assignors of Joseph R. Miller. Patented Aug. 2, 1853.

I claim the construction arrangement and formation of submarine and subterranean avenues, by means of cast iron sections united together by flanges and bolts, in the manner and for the purpose herein described.

2505.—METHOD OF EXTRACTING CREAM FROM WHEY.—Kilian Egger, South Cortland, N. Y. Patented Sept. 25, 1866.

I claim the process above described for extracting the cream from the whey, substantially as specified.

2,506. — TOBACCO PIPE.—George W. Francis and W. L. Woods (assignors to W. L. Woods), Washington, D. C. Patented April 11, 1865.

We claim. First, A tobacco pipe, having an inverted bowl, with the stem or vent at the top, and the opening at the bottom, substantially as and for the uses and purposes as above described.

Second, We claim the inverted conical bowl, B, combined with the cap, C, with its air holes, E, substantially as described, fig. 5.

Third, We claim the conical bowl, B, combined with the case, A, substantially as described in fig. 2.

Fourth, We claim the bowl, B, solid or in sections, combined with the cap, C, and the vent, D, substantially as and for the uses and purposes, as above described.

2,507.—MODE OF PREPARING ANIMAL MATTERS FOR USE AS A FERTILIZER.—Amor Smith, Cincinnati, Ohio. Patented Jan. 1, 1867.

I claim the herein described process for preserving the perishable parts of animal matter, consisting of the fleshy portions alone, or mixed soft and hard parts, from decomposition by subjecting the same to pressure after being boiled, substantially as and for the purpose set forth.

2,508.— CONSTRUCTION OF BURGLAR-PROOF SAFES, AND THE PREPARATION OF MATERIALS FOR THE SAME.—William Terwilliger, William H. Terwilliger, and John S. Lockwood, New York City. Patented July 24, 1866.

We claim, First, The alternating of iron and steel, welded together in plates or bars, in making the lining, case, or shell of burglar-proof safes.

Second, The process of welding iron and steel plates by the use of a solution of borax and saltpeter (or their chemical equivalents for welding purposes), in paint form, laid on the surfaces to be united, by being then heated to the proper heat, say 1500° Fah., or thereabouts, and rolled under great pressure, or hammered till chemically united or welded.

Third, The alternating of iron and steel plates or bars, united or welded by the use of the welding composition, applied as above described, to make better and cheaper materials than those now used for burglar-proof safes.

DESIGN.

2,595.—MILITARY MONUMENT.—John S. Armstrong, Prairie du Chein, Wis.

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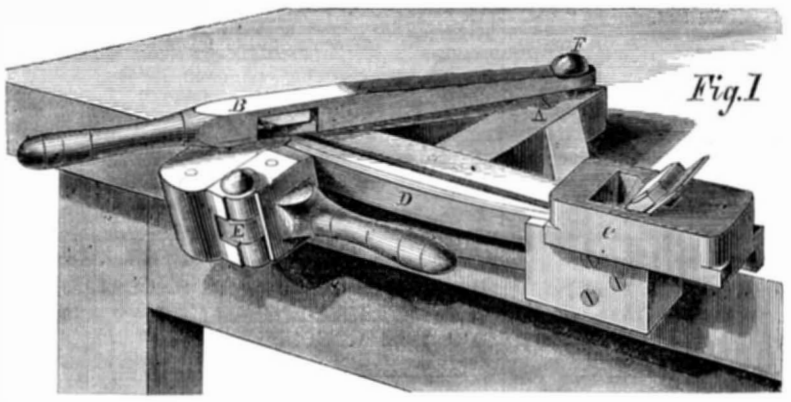
Improved Hand Stave Jointer.

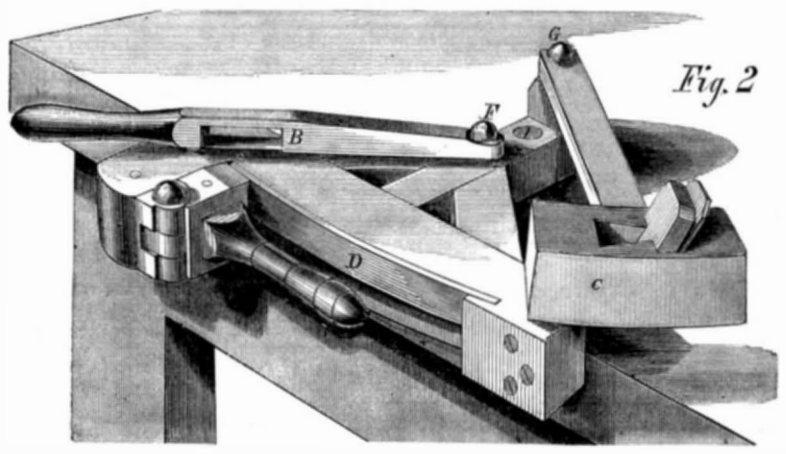
The advantages of a hand implement for the jointing of barrel staves will be conceded by coopers, who, not possessing steam or water power with the necessary machinery, are compelled to the tedious and laborious process ordinarily employed.

The engravings represent two forms of a device for this work which are the subjects of two patents, issued Aug. 21 1866 and Jan. 29, 1867. The machine, when in use, is secured on a bench by the screw, A. The working parts consist of a knife, B, and plane, C, as seen in the engravings. In Fig. 1, the plane is guided straight across by means of a rabbet, cut in the front piece of the frame, in which the plane runs by means of a projection on the inner edge of its bottom. The front of this frame is curved both longitudinally and transversely to conform to the bilge and lengthwise curve of the cask. At one end a recess receives the end of the stave, D, the other end of which is secured by the rule-joint holdfast, E. The knife, B, being pivoted at F, is swung across the stave from end to end, and is sufficient, without the plane, to produce a joint close enough for dry materials, while the plane will insure a perfect water-tight joint.

The inventor considers the machine represented in Fig. 2 as in some respects an improvement on that shown in Fig. 1, inasmuch as the joint produced is of the same relative bevel from end to end as the plane, being pivoted at G, the plane iron presents itself at all points at the same angle to the stave.

The efficiency of this contrivance is too apparent not to be seen, and its simplicity of construction and ease of operation are sufficient recomendations for its adoption. Rights for territory, etc., can be obtained by addressing the patentee, James F. Sayer, Pope's Mill, St. Lawrence Co., N. Y.





SAYER'S HAND-STAVE JOINTER.

The Sun's Spots---A Discovery.

The astronomers of Kew Observatory have been engaged in observing and comparing with great nicety, from time to time, the spots on the sun, with a view to discovering some cause with which their changes may be connected. They have found that the expansion and contraction of the spots proceed at a regular rate according to their varying position in the apparent disk; the spots increasing invariably from left to right, and attaining their maximum at intervals of about nineteen or twenty months. The revolutions of the planet Venus, which proceed in like manner from left to right and occupy also about twenty months, were next compared with the changes in the spots and were found to correspond. The area of spots exposed to view toward the earth was found to be uniformly greatest when Venus was on the opposite side of the sun, and least when the observed side was exposed most directly to her influence. Jupiter also, from its great mass, exercises an influence upon the spots, although from its distance it is not predominating. When Jupiter and Venus were both in opposition to the earth, the spots were much more enlarged than when Venus was in opposition and Jupiter in conjunction with the earth. The nature of the influence evidently exerted, is thought to be suggested perhaps in an opinion expressed by Prof. Tate, "that the properties of a body, especially those with respect to heat and light, may be influenced by the neighborhood of a large body;" and an influence of this kind would naturally be most powerful upon a body possessed of a very high temperature, like the sun; a very small increment of heat causing a mass of liquid to assume a gaseous form, and *vice versa*. So that the heat withdrawn by Jupiter and Venus from the side exposed toward them, might be sufficient to cause a copious condensation of gases which might have a visible effect directly, or produce mechanical changes by means of altered reflection varying the distribution of a great amount of heat. This conjectural explanation must be held subject to the results of a more extended comparison of facts.

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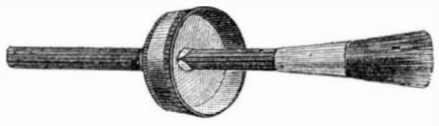

those which admit the handle through a threaded hole, and the cutting and scraping action of those made from thin metal, having a sharp edged hole. In this the hole is made by cutting radial slits, the metal between them being bent downward and acting as a spring against the brush handle. It is tenacious enough to hold the brush in place, but yielding enough to allow it to be elevated or depressed as required. Its advantages are obvious.

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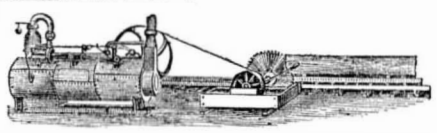

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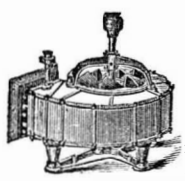

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